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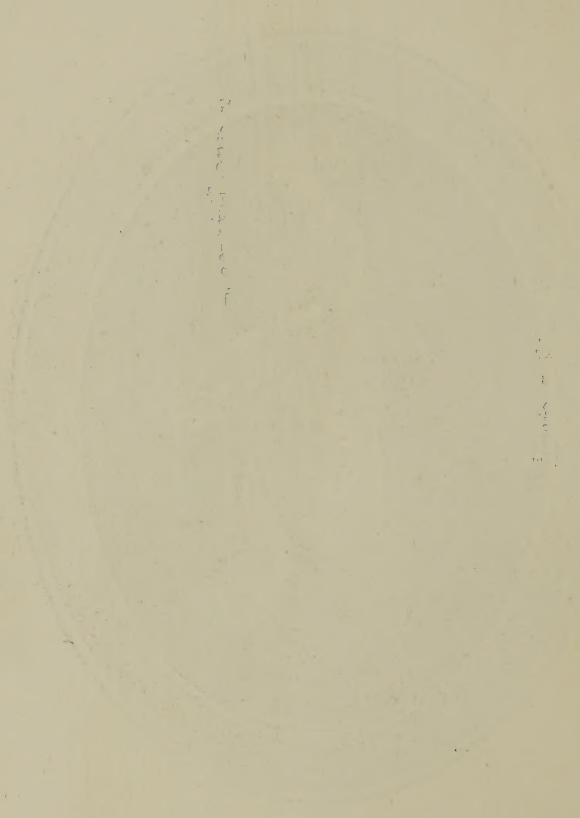








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TRANSACTIONS

OF THE

Sanitary Institute of Great Britain.

VOLUME III.

---

1881-82.

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EDITORS:

HENRY C. BURDETT, F.L.S., F.S.S.

F. S. B. F. DE CHAUMONT, M.D., F.R.S.

LONDON:

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## P R E F A C E .

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IN presenting the Third Volume of the Transactions of the Sanitary Institute the Editors have to point out that no Congress took place in 1881, and that there was in consequence an absence of the usual matter for a volume. The International Medical Congress, and the large Medical and Sanitary Exhibition, established in connection with it at South Kensington, rendered a Congress and Exhibition both less necessary and less easy to carry out at the time of year which is generally most convenient for the members of the Institute. It was therefore decided to suspend them for the year; but at the same time it was considered desirable that a Report on the Exhibition at South Kensington should be made, seeing that it contained much that was of permanent sanitary interest. Such a Report has accordingly been prepared, and will be found in the present volume.

The Papers read at the Ordinary Meetings, with the discussions following them, as well as the Addresses at the Anniversary Meetings, will also be found. Among them are subjects of great interest and public utility.

It is, of course, understood that authors are alone responsible for the opinions expressed in Papers, Addresses, or Discussions.

The Congress and Exhibition of 1882 will take place at Newcastle-upon-Tyne, at the invitation of the Mayor and Corporation of the city, and under the Presidency of Capt. DOUGLAS GALTON, R.E., C.B., D.C.L., F.R.S. The Congress will commence on the 26th of September, and terminate on the 30th. The Exhibition will remain open till Oct. 21st.

It is intended, for the future, to issue the Transactions at the close of the Winter Session.

## ADVERTISEMENT.



THE Institute, as a body, is not responsible for the facts and opinions advanced in the addresses and papers published in its Transactions.



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# Sanitary Institute of Great Britain.

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## FORMATION OF THE INSTITUTE.

THE increasing importance attached to Sanitary Science and the recognised position it was assuming in the public mind, appeared to the promoters of the Sanitary Institute fully to justify the formation of a National Society, the object of which should be to devote itself *exclusively* to the advancement of all subjects bearing upon Public Health. In furtherance of the object, a meeting was held at St. James's Hall, on the 13th of July, 1876, at which His Grace the Duke of Northumberland presided, when it was unanimously resolved:—

First—"That in the opinion of this meeting the sanitary condition of this country is still very unsatisfactory, and that further legislation is necessary with a view to its improvement; and that for the purpose of collecting and imparting information upon all matters connected with the subject of 'Public Health' a Society be now formed, to be styled 'The Sanitary Institute of Great Britain.'"

Second—"That the gentlemen whose names are appended be requested to act as a Committee (with power to add to their number) for the purpose of carrying out the previous resolution and of reporting to an adjourned public meeting to be held during the second week in October next."\*

The Committee appointed to report upon the subject considered it would add greatly to the usefulness of the Institute if Mayors of Boroughs, Chairmen of Local Boards, Sanitary Authorities, Medical Officers of Health, and all who have to administer the Public Health Acts, would associate themselves with the Institute, either in their individual or corporate capacity, and take part in its proceedings. By thus bringing their united knowledge and experience to bear upon Sanitary matters, the laws relating to the same would become better known and be more efficiently administered.

## BASIS OF THE CONSTITUTION OF THE INSTITUTE.

### SECTION I.

#### *Charter of Incorporation, Membership, and Government of the Institute.*

As soon as practicable a Charter of Incorporation shall be obtained, as it will facilitate some portions of the work of the Institute, more

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\* An adjourned public meeting was held on the 14th of March, 1877, when the report was unanimously adopted and a Council subsequently appointed to carry it into effect.

especially the examinations as set forth in Section II. Until a Charter is obtained, the examinations shall be continued as heretofore, and a Register of persons certificated as competent to act as Local Surveyors and Inspectors of Nuisances shall be formed.

The Institute shall consist of Fellows, Members, Associates, and Subscribers.

Fellows shall be elected by ballot by the Council, and shall include scientific men of eminence, persons of distinction as Legislators or Administrators, and others, who have done noteworthy Sanitary work.

All Fellows (except those who have already become Life Members) shall pay a fee of Ten Guineas on taking up the Fellowship, and such fee shall entitle the Fellow to all the privileges and advantages of the Institute for life without further payment.

Any person proposed by three Fellows or Members, shall be eligible for election as a Member of the Institute.

Members shall be elected by ballot by the Council, and shall be eligible to serve on the Council, and to vote at all Elections and Meetings of the Institute. The admission Fee payable by a Member shall be Three Guineas, and the Annual Subscription Two Guineas.

Medical Officers of Health and Medical Men holding Certificates in Sanitary Science from any University or Medical Corporation shall be entitled to be enrolled as Members of the Institute without Admission Fee.

Members desirous of becoming Life Members may do so on payment of Ten Guineas in lieu of the Annual Subscription.

All persons who have passed the Examination and received the Certificate for Local Surveyor from the Institute, shall, by virtue of having so passed, become Members of the Institute upon the payment of Five Guineas (without Annual Subscription), in addition to the fee paid for the Examination.

Any one proposed by two persons, either Fellows, Members, or Associates of the Institute, shall be eligible to be elected as an Associate of the Institute, the election to be by ballot by the Council. The Admission Fee payable by Associates shall be Two Guineas, and the Annual Subscription One Guinea.

All persons who have passed the Examination and received the Certificate for Inspector of Nuisances from the Institute, shall, by virtue of having so passed, become Associates of the Institute upon the payment of Three Guineas (without Annual Subscription), in addition to the fee paid for the Examination.

Persons of either sex, interested in the advancement of Sanitary Science, shall be entitled to be enrolled as subscribers on payment of One Guinea annually. Annual Subscribers shall be entitled to attend and to take part in the discussions at all meetings and Congresses of the Institute, and shall have free admission to the Conversazioni and Exhibitions of Sanitary Appliances held in connection with the Institute, so long as they continue to pay their Subscription.

Donors of Ten Guineas and upwards shall be entitled to be enrolled as "Life Subscribers," with all the privileges and advantages of Annual Subscribers without further payment.

Subscribers of Half-a-Guinea to any Congress of the Institute shall be entitled to a card of admission to the Meetings, Addresses, Conversazioni, Excursions, and Exhibition held in connection with that Congress.

The Institute shall be governed by a President, Vice-Presidents, and a Council of Twenty-four, consisting of Fellows and Members of the Institute, of whom not less than two-thirds shall be Fellows. The Council shall be chosen by the Fellows and Members. One-fourth of the Council shall retire annually, and shall not be eligible for re-election for one year.

The first President of the Institute shall be His Grace the Duke of Northumberland. Future Presidents and Vice-Presidents shall be elected by the Council. The Council shall have the power of electing Honorary Members of the Institute, Honorary Foreign Associates, and Corresponding Members of the Council.

## SECTION II.

### *Objects of the Institute.*

To devote itself to the advancement of Sanitary Science and the diffusion of knowledge relating thereto.

To examine and to grant Certificates of Competence to Local Surveyors and Inspectors of Nuisances, and to persons desirous of becoming such or of obtaining the Certificate. The Examinations shall be held at such times and in such places as the Council may direct.

A Board of Examiners shall be appointed by the Council; such Board shall consist of gentlemen representing Medical, Chemical, and Sanitary Science, Engineering, Architecture, and Sanitary Jurisprudence.

The Examination for Local Surveyors shall include a competent knowledge of the Statute relating to Sanitary Authorities, of Sanitary Science and Construction, and of Engineering.

The Examination for Inspectors of Nuisances shall comprise the elements of Sanitary Science, together with Sanitary Construction, and the Statutes relating to the prevention of disease and the suppression of nuisances injurious to health.

Fees shall be charged for the Examinations, and a Certificate of Competence, signed by the Examiners, shall be granted to successful candidates, entitling them to be designated as "Certificated by the Sanitary Institute of Great Britain."

A Congress shall be held by the Institute for the consideration of subjects relating to Hygiene at such times and places as the Council may direct.

Exhibitions of Sanitary Apparatus and Appliances shall be held from time to time as the Council may direct.

Fellows, Members, Associates, and Subscribers shall have the right



of Free Admission to the Exhibitions of the Institute whenever they are open. All fees payable by Exhibitors and the Public shall be fixed by the Council and belong to the Institute.

A Catalogue shall be published under the direction of the Council as a permanent record of the Exhibitions.

The Institute shall take such steps as may be within its power to obtain a complete registration of sickness, especially of preventable diseases.

The Institute shall endeavour to secure the services of medical men and others specially qualified to give lectures on subjects relating to the prevention and spread of disease.

The Institute shall encourage the formation of classes for technical instruction in Sanitary Science in such a way as may seem advisable to the Council.

A Library shall be formed in connection with the Institute.

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# Sanitary Institute of Great Britain.

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## ANNUAL REPORT

FOR 1880-1.

IN presenting their Fourth Annual Report, the Council have to point out that during the past year the Sanitary Institute has been steadily acquiring support, and the public manifest an increasing appreciation of its labours.

The Fourth Anniversary Meeting of the Institute was held, by the kind permission of the Council of the Royal Institution, in their theatre, on July 8th, 1880. The Right Hon. Earl of Shaftesbury, K.G., Vice-President of the Sanitary Institute, occupied the chair, and presented the medals and certificates awarded to the successful exhibitors at the Exhibition at Croydon. A paper was read by Captain Douglas Galton, R.E., C.B., F.R.S., Vice-Chairman of Council, on "The Preventible Causes of Impurity in London Air." The paper was ordered to be printed for circulation.

By invitation of the Mayor and Corporation of Exeter, the Fourth Congress and Exhibition in connection with the Institute was held at Exeter, under the Presidentship of the Right Hon. Earl Fortescue. The Institute was most hospitably received by the Mayor and Corporation. The meetings of the Congress were very well attended throughout, and were reported with exceptional fulness, both by the Metropolitan and Provincial press. There was a full supply of papers, some of them of great interest, and leading to important discussions. As, however, the proceedings of the Congress have been fully reported in Volume II. of the Transactions of the Institute, it is unnecessary to refer to them at length. The Exhibition was well supported, there being 106 exhibitors and 500 exhibits. Nine prize medals and 35 certificates of merit were awarded at the close of the Exhibition, and 30 exhibits were reserved by the judges for deferred practical trial. The results of the deferred trials will be made known at the Anniversary Meeting, on July 14th, when the medals and certificates will be presented.

At the commencement of the present year the Council determined to hold Ordinary Meetings of the Institute, for the reading and discussion of papers and the delivery of lectures and addresses. At the first Meeting, February 9th, a paper was read by Mr. W. H. Michael, Q.C., F.C.S., upon "The Law in Relation to Sanitary Progress." (See Appendix, page 3.) The discussion which followed upon the reading of the paper was continued at the subsequent adjourned Ordinary Meeting of March 9th. Mr. Michael's paper, and the discussion

upon it have been printed, and will appear in the Transactions. At the Meeting on April 13th an Address was given by the Chairman of the Council, Dr. Richardson, F.R.S., entitled, "Suggestions for the Management of Cases of Small Pox and of other Infectious Diseases in the Metropolis and Large Towns." (See Appendix, page 49.) The discussion upon this important subject was continued at an adjourned Meeting held on April 27th, and had to be further adjourned to May 18th.

The Council are of opinion that valuable facilities will be afforded by means of the Ordinary Meetings for the promotion of the objects of the Institute, and they therefore trust that the Fellows and Members, and all interested in the advance of sound sanitary knowledge, and in its wider diffusion, will assist in developing the utility and interest of the Ordinary Meetings of the Institute.

Two Examinations of candidates for the Institute's certificate of competency as Local Surveyor or as Inspector of Nuisances have been held during the year, under the direction of the Council. At the Examination, in June, three candidates presented themselves for examination as Local Surveyors, and one as an Inspector of Nuisances. Two certificates of competency as Local Surveyors, and one certificate of competency as Inspector of Nuisances were granted by the Institute. At the Examination in November, seven candidates presented themselves for examination as Local Surveyors and two as Inspectors of Nuisances. Four certificates of competency as Local Surveyors, and one as Inspector of Nuisances, were granted by the Institute.

The retiring Members of Council this year are A. Haviland, M.R.C.S.; Lieut.-Col. Jones, V.C., ASSOC. M. INST. C.E.; G. Palmer, M.P.; T. Salt, Major-General H. Y. D. Scott, R.E., C.B., F.R.S., and G. Wilson, M.A., M.D. The names of the following gentlemen are submitted for election at the Annual Meeting to fill the vacancies thus created:—B. Browning, L.R.C.P., M.R.C.S., S.S.C. CERT. EDIN.; W. Collingridge, M.R.C.S., B.A., M.B., S.S.C. CERT. CAM.; H. H. Collins, F.R.I.B.A.; T. J. Dyke, F.R.C.S.; E. C. Robins, F.R.I.B.A.; H. Robinson, M. INST. C.E.

In July, the offices of the Institute were moved from Spring Gardens to the more convenient premises at 9, Conduit Street.

In the Autumn of 1880, Major McCoy resigned the Secretaryship, and Mr. E. White Wallis was elected to fill that office.

The Wyatt Edgell Prize, for an essay on "The Range of Hereditary Tendencies in Health and Disease," has not yet been awarded, owing to the amount of matter to be dealt with, and the difficulties incidental to the award, which, it is hoped, may be made prior to the Anniversary Meeting on July 14th.

As mentioned in the previous Report, the Council appointed a Committee, consisting of Captain Douglas Galton, R.E., C.B., F.R.S.; Rogers Field, B.A., M. INST. C.E.; and W. Eassie, C.E., to carry out further experiments on Cows and other automatic modes of Ventilation. Before proceeding to the experiments on the cowls, the Committee decided to carry out a series of experiments to test the accuracy of the anemometers and air-meters which they required for

the trials of the cowls. These experiments have been carried on continuously during the last two years. After much labour, they have proved that the corrections supplied with the instruments are not to be relied upon, and, consequently, that an entirely new set of corrections must be determined for every instrument.

Experiments with air-meters have been carried on at the Gas Works, Battle Bridge, and a special stage has been erected at Kew Observatory for the trial of the anemometers and cowls.

The experiments on the anemometers and air-meters were not contemplated in the original programme of the Committee, and the unforeseen expenses which have been thereby entailed make it necessary for the Committee to ask for further subscriptions, to enable them to complete their investigation satisfactorily. Contributions may be forwarded to Mr. Rogers Field, 5, Cannon Row, Westminster, who has consented to act as Treasurer of the Special Cowl Experiment Fund, which, with the approval of the Council, has been raised to meet the incidental expenses.

During the year Vol. I. and Vol. II. of the "Transactions of the Institute" have been published. Vol. I. contains an account of the proceedings of the Congress held at Croydon in 1879; and Vol. II. an account of the proceedings of the Congress held at Exeter in 1880. The Council look to the annual publication of the "Transactions of the Institute" as a great means of increasing its usefulness, by circulating the valuable papers and addresses read at the various meetings, and also preserving them for future reference.

The additions to the Library have not been very numerous; but the Council have determined upon active steps for the collection and arrangement of books relating to Sanitary Science, and have ordered a circular to be sent to the Fellows and Members inviting donations to the Library.

By order,

E. WHITE WALLIS,

*Secretary.*

9, Conduit Street, W.

*May 25th, 1881.*



# SANITARY INSTITUTE

### *Abstract of Cash Receipts and Payments*

[illegible]

## EXHIBITION

						£	s.	d.
To Balance 1st January. 1880	..	..				226	11	3
„ Receipts .. .. .	..	..				160	18	10
						<u>£387</u>	<u>10</u>	<u>1</u>

Audited and found correct with books of Institute,

MAGNUS OHREN, }  
ERNEST TURNER, } AUDITORS.

# OF GREAT BRITAIN.

for the Year ending 31st December, 1880.

	£	s.	d.	£	s.	d.
By Expenditure:—						
Office Furniture and Repairs ..	78	17	11			
Rent and Taxes .. ..	43	0	2			
Salaries and Wages .. ..	127	5	11			
Postage, Telegrams, and Carriage	69	8	1			
Petty Expenses .. ..	34	10	4			
Stationery and Printing .. ..	110	3	6			
Advertising .. ..	7	3	5			
Examination Expenses .. ..	19	12	0			
Congress Expenses .. ..	66	15	4			
Bank charges .. ..	0	2	7			
Quilter, Ball & Co., Accountants, 1879 accounts .. ..	10	10	0			
Heaton & Sons, Medals, &c. ..	7	1	8			
				574	10	11
„ Balance at Bankers as per Pass Book of the Institute, December 31st, 1880, viz:—						
Wyatt-Edgell Fund .. ..	200	0	0			
Deferred Exhibits .. ..	80	17	7			
On Drawing Account .. ..	215	5	0			
				496	2	7
„ Cash in hand:—						
Cheques Paid to Bankers after the 31st December .. ..	46	4	0			
Petty Cash .. ..	6	7	9			
				52	11	9
				£1,123	5	3

## ACCOUNT.

	£	s.	d.
By Expenditure .. ..	105	4	2
„ Balance, as per Pass Book (Exhibition A/c)	282	5	11
	£387	10	1



## MODERN SANITARY SCIENCE.

ADDRESS BY PROF. F. S. B. F. DE CHAUMONT, M.D., F.R.S.

*Anniversary Meeting, July 14th, 1881.*

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THERE is so much that might be comprehended within the title I have chosen, that it may seem an adventurous, if not a presumptuous thing, to propose to treat so large a subject in the short time to which an address of this kind must necessarily be limited. It is, however, not my intention to attempt either an exhaustive treatise on first principles or to go into wearisome details of practical sanitation. Neither of these would be suitable for an occasion like this, although it may be necessary to touch upon both subjects of inquiry in the remarks I propose to offer. The title, "Modern Sanitary Science," has been adopted, not without reason, for it is essentially "modern" views that demand our attention, however much we may feel we owe to the past. We know that our forefathers were not entirely blind to the necessity of caring for their own health and that of the community,—and we can trace back into the night of time rules or traditions which were no doubt as much the outcome, in some instances at least, of previous practical experience as of the superstition to which it has been too much the custom to attribute them. But much, if not the greater part of all this was unintelligent, in the sense that it was either the result of a more or less indiscriminating experience, or a blind following of a previously-acquired habit. In many cases, doubtless, there gradually arose around the practices in question myths of a more or less fantastic character, relics of which linger in our practices of the present day. Many savage tribes, and many who cannot by any means be called so in other things, attempt to propitiate the Spirit of Evil in order to avert disease among other woes, just as the Hindûs worshipped the Goddess of Small-pox, until they found in vaccination a more practical though less awe-inspiring protector. It would not be difficult, however, to show that the vaunted civilisation of our own Western Races is but little in advance of those whom we are inclined to despise. When cholera invaded this country, some thirty years ago, some worthy people petitioned the late Lord Palmerston to appoint a day of humiliation and prayer for the purpose of warding off the dreaded disease. This was too much for the keen practical



sense of that great statesman, and he declined to accede to the petition, at the same time recommending them to resort beforehand to the more prosaic, but not less necessary work, of cleaning their own dwellings and cities, on the principle that Heaven helps those who help themselves.

When, therefore, I speak of "Modern Sanitary Science," I desire to look at the question from a point of view that shall have nothing "abergläubisch" about it—I wish that we should be prepared to take up the subject on as strict a scientific footing as existing circumstances will allow, and to treat it in the same way as we treat astronomy and physics. Astronomers do not look to supernatural or extraordinary causes to account for phenomena that are even themselves apparently out of usual reckoning. When a comet appears that has not been seen before, they simply know this, that it is another proof of the immense amount of possible knowledge that is still unascertained; but instead of merely wondering, they proceed straightway to study the phenomenon, to note all that can be observed about it, to calculate its orbit, and its various astronomical elements,—so that before it takes its departure it is possible to say, not *adieu*, but *au revoir*, the astronomer having pretty accurately ascertained when its return may be expected, and leaving behind him a full, true and particular description by which it may be known by future ages. Similarly, the physical philosopher knows perfectly well that any new phenomenon, however apparently remarkable, will be explicable on ascertained laws, or upon others to which these will surely lead up. The supernatural, or rather, extra-natural in those is left to astrologers, spiritualists, and the like, with whom true science does not trouble itself.

So much for the expression, "Modern." It may now be asked—Is the expression "Sanitary Science" justified? Well, this is a point on which a good deal might be said, both for and against,—but I may say, preliminarily, that the expression is pretty generally accepted and has taken its place in our vocabulary. Some of the Universities and Licensing bodies have adopted it, and issue diplomas and certificates in "Sanitary Science,"—but this of course by no means vindicates the claims of Sanitation or Hygiene to the dignity of a Science. If, however, we were to push this principle too far, we should have to modify our nomenclature considerably and refuse the name of Science to many respectable branches of inquiry. It would be extremely difficult, otherwise, to use the expression accurately, for it would be impossible to draw any hard and fast line as to how much of the particular knowledge was or was not so evidently under the rule of fixed law, as to enable us to predict

what would occur under certain circumstances. It may suffice, I think, for practical purposes, to use the expression science, either for a branch of knowledge, which, like Astronomy, is so rigidly and *evidently* under the reign of law, that events of almost any distance in space or time may be confidently and accurately forecast, or for such branches of knowledge as have not yet been ascertained to be so rigidly governed by laws *known to us*, but which we propose and try to inquire into on true scientific principles, and to the exclusion of mere metaphysics or extra-natural speculations. To these last belong Social Science, Political Economy, &c., and to the same class we must for the time relegate Sanitary Science, at least provisionally. But we know and feel that this comparatively inferior position will only be temporary, and that as Biology and other collateral sciences advance, so will Sanitary Science receive promotion, and ultimately vindicate for itself a position in a more honourable and exalted sphere.

At present in Sanitary Matters we are working to a great extent, not perhaps actually in the dark, but by the light of somewhat indifferent illumination,—resembling in some instances that darkness visible which gives weird outlines to objects that would be simple and ordinary enough in the broad light of day,—outlines that impress the visual faculties of different observers so variously, that each is apt to draw his own conclusion and treat with contumely that of his neighbour. But by persistent and careful work the eye becomes accustomed even to the dim light, and may make out with accuracy of detail the nature of the phenomenon observed, but it will only be by careful co-operation and by getting access to it from various directions that that complete and full illumination will be accomplished that shall make it an object recognisable for all time. Thus every one connected with Sanitation may contribute to the fashioning of the whole by bringing his contribution of accurate and careful observation and record, leaving hypotheses and theories to take care of themselves, until the proper time shall come when they may be legitimately formulated. Every step that we can take in the direction of mathematical precision, by reducing to weights and measures all phenomena capable of such resolution, is a step in the true direction of scientific accuracy, and will lead to the advancement of the less certain Sciences to a higher status. Such mathematical application has been found possible even in Political Economy and Social Science, how much more likely is it to be possible in Sanitary Science, which is already founded on the bases of the more exact sciences to so large an extent! We may, therefore, look hopefully to the future and confidently

apply the term Science to Sanitation if we approach the work in the spirit I have indicated, with honest and humble endeavour to question nature, not to dictate to her, to seek honestly for the truth, and not merely for the means of establishing our *doxy* and upsetting our neighbour's.

It may now be legitimately asked what Modern Sanitary Science really is, and how far it justifies the demand that we should regard it with favour? We may consider this question with reference to the following points: 1st, What are the objects of Sanitary Science, and on what principles is it based? 2nd, How are those objects to be carried out, and how are the principles to be applied? 3rd, What has been achieved up to the present time? and 4th, What are the prospects for the future?

1. What are the objects of Sanitary Science? These are simple and obvious. It desires to preserve the lives and health of the community. It seeks to diminish the inordinate waste of life which is continually going on. Even now, one-half of the population dying in childhood is throughout its existence absolutely unproductive. The average age at death throughout the United Kingdom is only 39, of which barely one-half has been productive. On the other hand, the average in our great cities has been shown by Dr. Farr to be much lower, as low as 26 in Liverpool, so that there is hardly one-third of this productive. This evil if left to itself tends to increase from the continual removal of the populace from the country into the town and the consequent multiplication of insanitary influences. Sanitary Science further proposes that lives shall not only be preserved but that they shall be preserved under the best possible circumstances, with health and strength to enable them not only to find means of supporting themselves and those dependent upon them, but also of adding to the wealth and productiveness of the community and nation at large. It desires to extinguish diseases recognised already as preventible, and to seek out the causes and favouring conditions of others in the hope that they too may be prevented. What are the principles on which the Science is based? Here we find a question difficult to answer if rigidly scientific grounds are looked for, but we may still formulate certain principles which shall serve well enough for practical purposes. In the first place, we base it upon the knowledge positively obtainable through other branches of science. We appeal to geology, mineralogy, physiography, &c., for information with reference to the ground that we live upon. We are enabled to know its composition, the order of its strata, the character of its surface, and the vegetation that covers it; we appeal to chemistry and physics to tell us the



character and movements of the water and the air in the ground and in the atmosphere; we ascertain what are the normal constituents, and in what way there is occasional deviation from the usual standard; we ascertain from physiology the healthy condition of the human functions and the circumstances under which change takes place; we go to medicine and obtain a knowledge of disease, how it is to be accurately diagnosed, what are the phenomena accompanying it, and whether or not it seems to be capable of being directly communicated from individual to individual. Morbid anatomy, with the aid of the microscope and animal chemistry, tells us the particular organs affected, and the nature and characters of the resulting changes. All these are scientific facts upon which to build superstructure. But here the difficulty begins: we have to obtain most careful and trustworthy observations in order that we may connect disease with certain circumstances which may be observed and investigated; and, above all, we must be able to approach the investigation with minds as little biased as may be. Unfortunately, a mind free from prejudice is a rare thing, and hence the many mistakes in this as in other things. We may say, however, that we have ascertained certain points, or so nearly ascertained them, as to make them practically matters of certainty. Some diseases have been actually traced to active causes, or at least the possibility of communicating them with certainty has been so well demonstrated as to limit the area of search. Others still remain more or less unsolved problems, although we have made some progress in ascertaining the conditions favouring their propagation. We are at all events pretty certain of this, that diseases do not arise indifferently, but are due to certain causes, which we hope will admit hereafter of being traced out and analysed. Recently researches by various inquirers have held out hopes of still further progress being made, so that not only the real active causes of individual maladies may be demonstrated, but even that it may be possible so to treat and, as it were, cultivate those *verae causae*, as to produce a benign agent which shall protect from the severer form, just as vaccine virus does from small-pox. In the meantime, we have ascertained by the evidence of repeated observation that certain conditions of existence are unfavourable to health and favourable to the development of certain diseases; that the living on a wet and contaminated soil, the drinking of polluted water, the breathing of a vitiated atmosphere, the crowding together of human beings, all have their own powerful influence in favouring the spread of disease. To these we may add improper and insufficient nourishment and clothing, besides other points of personal hygiene, such as personal cleanliness, individual excesses, &c.



Now, although it may be said that after all there are no great fixed scientific principles here, such as the law of gravity or of chemical affinity, yet we may claim so far to have come to a general principle of some importance, and that is this: that human ills in a sanitary point of view arise from the presence of matter in the wrong place. Everything has its uses in this world, but anything may be fraught with immeasurable evil if it be put to wrong use. In no case is this clearer than in Sanitation. We have to defend the organic frame that constitutes our body against the various antagonistic organic substances that are external to us. What we require is a continual and proper redistribution of matter, an unremitting attention to the great problem of how matter is to be taken to its proper place in the world, where it shall expend its potential energy in useful productive work, and not in effecting the destruction, rapid or gradual, of the human race. It is only in modern times that the important bearing of this great principle has been distinctly recognised, and chiefly since the circulation of matter was understood, as well as the real origin of the energy of organic bodies.

2. How are those objects to be carried out, and how are those principles to be applied?

Bearing in mind the principle of the redistribution of matter, we may say that this may be best carried out by seeing that the appropriate place be found for all kinds of matter, and that matter (particularly organic matter) be allowed to remain nowhere where it is likely to expend its energy in the propagation of such low forms of life as are believed to be inimical to human economy. Thus, we must carry out such means of removal as shall carry away from our dwellings at once all refuse, both excretory and other,—we must effectually prevent the entrance into our dwellings of any injurious matter from without, either in the form of effluvia from drains or other nuisances, or of emanations from the soil on which the house is situated, we must cause an efficient and continuous change of air in our living and sleeping rooms, so that as little of the excreta of our skin and lungs shall return to us again as we can possibly prevent: we must cease to pollute the soil and the watercourses of the country with organic filth, but use such material for purposes of cultivation, so as to utilise it, instead of as at present poisoning ourselves and our neighbours, or throwing it into the sea: we must obtain pure and wholesome drinking water under such conditions as shall render contamination impossible. We must practice the most rigid cleanliness in person, clothing, and dwelling, and have ample air-space, so as to prevent overcrowding. We must further try and scatter our town popula-

tion more, by attempting to provide better dwellings, and by providing more open spaces so as to form lungs for the towns. The advantages of this last principle are very considerable, and have been dwelt upon by many writers. London is undoubtedly the healthiest of the great cities of the world, and it compares favourably in point of space with most others. Paris is computed to have 40 square mètres per head, whereas London has more than double. Dr. Farr has shown that the death-rate in this country corresponds very markedly with the degree of proximity of the population. Liverpool, where the average distance from person to person is only 7 yards, loses annually 1 person out of 26, and the mean duration of life is only 26 years. Manchester, where the people are 17 yards apart, loses only 1 in 31, and has 3 years more of life—9 districts, 28 yards apart, lose 1 in 36, and have an average duration of 32 years, and they proceed thus:—

74	districts,	46	yards	apart,	lose	1	in	40,	and	live	35	years.
137	”	97	”	”	”	46	”	40	”	”	”	”
345	”	139	”	”	”	53	”	45	”	”	”	”
53	”	147	”	”	”	60	”	51	”	”	”	”

These numbers are very significant, showing as they do the very great influence which crowding exercises on the health of the community—even when considered on this somewhat wide and general scale. In particular instances, according to degree, it has been recognised as one of the most disastrous factors in the propagation of typhus, plague, small-pox, and many other fatal diseases.

Another great work of sanitation is the improvement of the food of the people, and it here joins hands with political economy in attempting to increase the quality and the sources of food. To ensure also that the food shall be good and wholesome, in a sound condition itself, and free from dangerous or deteriorating adulteration, is another branch of the subject of the utmost importance.

We must also extend the knowledge of the public on sanitary matters to the widest extent. Much of the success in all these endeavours depends upon them, and without their co-operation little real progress can be hoped for.

3. What has been achieved up to the present time?—It has sometimes been said, that with all our boasted efforts Sanitation has not done much to diminish the death-rate of the community. Is this true? Hardly, I think. The return of the last census have just shown two points,—1st. That the birth-rate is larger

than was expected, and 2nd that the death-rate was smaller than was expected during the last ten years. The former is not a point that tells so directly in favour of Sanitation, dependent as it probably is upon an increase of general prosperity, a higher rate of wages, and the consequent possibility of obtaining the necessities of life with greater ease. But the second, the lower death-rate, is on a different footing. Had the rate continued between 1871 and 1881 the same as between 1861 and 1871 there would have died in England and Wales alone nearly 300,000 persons who are now living, a convincing proof that, as Lord Carrington told the House of Lords on the 5th instant, "Modern Sanitary legislation had produced useful and important effects." This is a diminution of 5 per cent. on the death-rate, or an addition of more than a year to the mean age of the community. Considering the difficulties that have attended every step in advance and the imperfections that still exist so largely in our public measures, I think this must be accepted as a highly gratifying result, holding out great encouragement for the future. Although we are not in possession of much accurate information as to the statistics of periods before the present century, we may gather from the data that are obtainable, that very great advance has been made generally. The population of Great Britain has doubled in about 60 years in this century, and there is every probability of its doing so in about 50 years, or perhaps even less in the next period,—so that before the year 1940 Great Britain will probably have 60,000,000 of inhabitants, provided nothing interferes to arrest its present rate of increase. Some people will say that this will be a doubtful blessing,—and it will be so if the means of production do not increase in an equal ratio. Without discussing this point and merely using the facts as a measure of the prosperity and health of the people, we find that in the last century it took nearly a hundred years to double the population. It is not easy to calculate out the details of a case when so much is wanting, but if the birth-rate had been the same as at present this would argue a death-rate of at least 28 per 1000, and a mean age at death of only 33 years. Previous to 1700 the doubling of the population must have been a very slow affair, and for a long time, what with wars at home and abroad, general or partial famines, and repeated visits of plague and other pestilences, there was in all probability a diminution of the population at many times rather than an increase. Perhaps nothing marks off modern from older times more than our immunity from general pestilences, due in a large manner to the gradual adoption of the rules of hygiene, particularly increased cleanliness in person and dwellings and improvement



in character and quality of food. Those points come out in a very striking manner when we consider the ravages made by pestilence in former times, and how gradually those have diminished down to our own day. Plague invaded this country twelve times during the 17th century, and at its last visit it slew 68,596 persons in one year, in London and the suburbs alone. Considering that the population at that time could not have been more than a tenth of what it is now, this was equal in proportion to the entire mortality of the whole of England and Wales *from all causes* at the present time. The cleansing fire of 1666 swept out of London the dens of filth which had, from time immemorial almost, invited pestilence into the very heart of the country, and from that time the disease dwindled down, until in 1704 the very name disappeared from the bills of mortality. It is true that in the present day we have from time to time visitations of cholera, but its ravages have been as nothing compared with those pestilences of former days, but we still have other maladies, such as enteric fever and the like, which remain more or less an opprobrium upon our Sanitary progress. If, however, we turn to groups of the community more directly under control, we may perhaps better appreciate what has been accomplished. Our Army and our Prisons are two good examples. The former has been especially valuable as furnishing instances, first of the evil effects of insanitary conditions, and 2ndly, of the excellent results of careful Sanitation. Up to the time of the Crimean War our troops, few in number and expensive to keep up, were allowed to die at a rate that would have been a disgrace to the worst managed institution. Yet those men were apparently better off than their brethren of the same rank in civil life, better fed, better clothed, and better housed, and certainly not more hardly worked. But what were the facts? At every age the deaths were double those of the similar male population of England and Wales, and much more than double, nearly three times, those of healthy districts:—and they were some 50 to 60 per cent. greater than in the most unhealthy Cities in the Kingdom. Her Majesty's Foot-Guards, supposed to be *élite* of the service, were the most unhealthy of all. The story of this has been often told, so I need not weary you with it again, but I would simply point out that when the causes of such insanitary conditions were ascertained steps were at once taken to remedy them, and that the result was even beyond expectation. And it says well for the soundness of Sanitary views that even a quarter of a century ago the Royal Commissioners were able to put their hands upon the causes of disease and death, and to say, "Remove these and you will have the soldier as healthy as the civilian." What has been

the result? If we take the table for 1878 (the last yet published) we find that instead of dying at thrice the rate of the male population of England and Wales, the chances of the soldier's life are now-a-days better than the civilians, during the most of the years that he serves with the colours.

RATIO OF DEATHS PER 1000 LIVING AT THE FOLLOWING AGES:

	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	
Army at Home, 1878.....	2.92	4.27	5.28	9.05	
Previous 10 years 1868-77 ....	3.09	5.42	7.89	12.52	Total Army mor- tality (1878) in United King- dom: 6.53 per 1000.
Civil Male Popu- lation: Eng- land and Wales	6.89	8.67	9.55	10.57	Before Crimean War: 18.0 per 1000.
Healthy Districts	5.83	7.30	7.93	8.36	

This is a very remarkable and encouraging result. The same may be observed in our Campaigns since the Crimean period, although they have been on the whole insignificant. They have, however, generally been signalized by a much smaller degree of sickness and mortality than in any previous experience. The immense importance of this, in operations of war, may be recognised when we consider the proportion that the losses from sickness bear to those from the shot and shell of the enemy. Were the latter the only danger in war, it would be almost comparatively insignificant. In the Crimean war we lost 22,000 men, of whom only 4000 died in battle or of wounds; the French lost about 20,000 in battle, and about 80,000 from disease; the Russians are believed to have lost about 80,000 in battle, and about half-a-million from disease. The American war showed the same; the Northern army lost 97,000 from battle, and 184,000 from disease; the Southern lost half-a-million, by far the greatest number from disease.

Our prisons tell a similar story; from being mere pest-houses in former times, they are now among the healthiest places in the Kingdom.

I might multiply instances if time permitted, and if it were necessary to prove the case that I have advanced, but I think I



have said enough to show that progress has been made in a way that is satisfactory and encouraging.

#### 4. What are our prospects for the future?

I think we may say that they are on the whole encouraging. The great hold that sanitary matters have got upon the public attention is evinced in many ways, by the number of writings and discussions on the question, by the great impetus given to the production of sanitary apparatus and requirements, as shown by the success of Sanitary Exhibitions in various places, notably those in connection with this Institute, and the great Exhibition about to open this week.\* We may cite the numerous societies for Sanitary purposes lately founded, and the steps taken for giving instruction, and issuing certificates in Sanitary Science. The legislation on the subject has also been encouraging, although falling far short of what is still desirable, and the valuable inquiries, carried out by the Medical Department of the Local Government Board, have done much to advance the cause. There is one point on which we ought to insist, and that is more extended means of instruction for all classes, and the exaction of certificates of competency from all who are officially charged with Sanitary duties, Medical Officers of Health, Borough and District Surveyors, and Inspectors of Nuisances. At present such certificates are entirely voluntary, and are taken by few. The Sanitary Institute is endeavouring to push this matter by examining Surveyors and Inspectors of Nuisances, and has already done good work. But means of instruction are still much wanted. We desire also that Sanitary knowledge should be distributed as widely as possible, as legislation is of but little use if it goes too far ahead of the knowledge and intelligence of the people.

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\* International Medical and Sanitary Exhibition, opened at South Kensington, 16th July, 1881.

# Sanitary Institute of Great Britain.

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## ANNUAL REPORT

FOR 1881-82.

THE Council of the Sanitary Institute of Great Britain, in presenting their Fifth Annual Report to the Fellows and Members, desire to point out that much progress has been made in Sanitary Science during the past year, and that ever increasing interest has been evinced in the cause for which the Institute was established.

On July 14th, 1881, the Fifth Anniversary Meeting of the Institute was held in the Lecture Theatre of the Royal Institution, the use of which was kindly granted by the Board of Managers. The chair was taken by the Right Honorable Earl Fortescue, Vice-President of the Institute, and the medals and certificates awarded at the Exhibition at Exeter, were presented by him to the successful exhibitors. A paper was read by Prof. F. S. B. F. de Chaumont, M.D., F.R.S., Chairman of the Council, entitled, "Modern Sanitary Science." The paper will be published in Vol. III. of the Transactions of the Institute.

The Ordinary Meetings of the Institute, which were commenced in February, 1881, were continued during the past year. On June the 21st a paper was read by Prof. W. H. Corfield, M.A., M.D., on "The present state of the Sewage Question." This Meeting terminated the first Session.

The Session 1881-82 was commenced on December 7th with an Inaugural Address, by Dr. Alfred Carpenter, Vice-Chairman of the Council. At this Meeting the Adjudicators reported the award of the Wyatt Edgell Prize. The papers and the discussions which followed will be published in Abstract in Vol. III. of the Transactions. Dr. Carpenter's Inaugural Address will also be published as a separate pamphlet. On February 15th a paper was read by Mr. Henry C. Burdett, F.S.S., on "The Administration and Hygiene of British Hospitals." On March the 8th the Wyatt Edgell Prize was presented, and a paper was read by Mr. G. Gaskoin, M.R.C.S., on the subject of the Prize Essay, "The Range of Hereditary Tendencies in Health and Disease." On April 19th a paper was read by Mr. Henry C. Stephens, F.S.S., entitled, "An Obstruction by the Law to Sewage Disposal," on which subject the Council are considering the desirability of taking further action, and of endeavouring to obtain amendments of the 15th and 21st clauses of the Public Health Act.

The Examinations for Local Surveyors and Inspectors of Nuisances established by the Institute, were held during the year in June and November. At the Examination in June six candidates presented themselves, three as Local Surveyors and three as Inspectors of Nuisances. Two candidates were certificated as competent to discharge the duties of Local Surveyors, and three as competent to discharge the duties of Inspectors of Nuisances.

At the Examination in November eight candidates presented themselves; four as Local Surveyors and four as Inspectors of Nuisances. No certificate of competency as Local Surveyor was awarded, but three candidates were certificated as competent to discharge the duties of Inspectors of Nuisances.

It is with much regret that the Council have to report the death of Sir Antonio Brady, who was among the first promoters of the Institute, and who for many years aided the Council by his advice and influence, and since 1877 kindly acted as one of the Trustees of the Institute. At a meeting of Council, on December 22nd, 1881, a vote of condolence and sympathy was unanimously passed, and communicated to his widow and family.

The Council have also to deplore the death of Thomas Aveling, Fellow; G. Cole, C.E., and Dr. Henry J. Yeld, Members; and Prof. A. Chevalier and Prof. Paulo Gorini, Hon. Foreign Associates.

Since last Annual Meeting there have been elected 13 Fellows, 20 Members, and 9 Associates. The numbers now on the Roll of the Institute are 88 Fellows, 190 Members, 15 Associates, 23 Subscribers, and 31 Hon. Foreign Associates. Total, 347.

The retiring Members of Council this year are W. Crookes, F.R.S.; T. J. Dyke, F.R.C.S.; W. Horton Ellis, F.M.S.; Magnus Ohren, ASSOC. M. INST. C.E., F.C.S.; and the Hon. F. A. Rollo Russell. The names of the following gentlemen are submitted for election at the Annual Meeting to fill the vacancies thus created:—Thomas Wrigley Grimshaw, M.D., Registrar-General for Ireland; James Lemon, M. INST. C.E., F.R.I.B.A.; F. Maxwell Lyte, F.C.S., F.I.C.; William Ogle, M.A., M.D.; J. Wallace Peggs, ASSOC. M. INST. C.E.; Right Rev. Frederick Temple, D.D., LORD BISHOP OF EXETER.

The adjudicators of the Wyatt Edgell Prize of £200—Dr. W. Farr and Dr. B. W. Richardson—for an essay on “The Range of Hereditary Tendencies in Health and Disease,” announced at the Ordinary Meeting on December 7th, that twelve essays had been sent in for competition, and that the Prize was awarded by them to the essay bearing the motto, “The Subtlety of Nature far exceeds the Subtlety of Reason,” which essay proved to have been written by Mr. G. Gaskoin, M.R.C.S., of Westbourne Park. The Prize was presented by the Rev. E. Wyatt Edgell at the Meeting on March 8th, and after the presentation a paper on the subject was read by the author. The Council are gratified to learn that the essay is about to be published by the author, and hope that this valuable contribution to the literature of so interesting a subject will soon be in the hands of the public.

The Committee appointed by the Council to carry out further ex-

periments on Cows and other Automatic Means of Ventilation, consisting of

CAPTAIN DOUGLAS GALTON, R.E., C.B., F.R.S.,  
ROGERS FIELD, B.A., M.INST.C.E.,  
WILLIAM EASSIE, C.E., F.L.S., F.G.S.,

have been continuing the work of testing the anemometers and air-meters required for the Cowl Experiments.

As mentioned in the Report of last year, it was found that the corrections supplied with the instruments were not to be relied upon, and that an entirely new set of corrections must be determined for every instrument. Experiments have been continued at the Gas Works, Battle Bridge, and elsewhere, during many months, with a view to determine these corrections, and in the course of these experiments many unexpected and important facts in relation to the working of the air-meters have been discovered. The results arrived at prove that until the experiments on the air-meters are completed no accurate conclusions can be hoped for with reference to the comparison of Cows.

The experiments on the anemometers and air-meters were not contemplated in the original programme of the Committee, and the unforeseen expenses which have been thereby entailed make it necessary for the Committee to ask for further subscriptions, to enable them to complete their investigation satisfactorily. Contributions may be forwarded to Mr. Rogers Field, 5, Cannon Row, Westminster, who has consented to act as Treasurer of the Special Cowl Experiment Fund, which, with the approval of the Council, has been raised to meet the incidental expenses.

In January last, the Council received a request from the Royal Commission appointed to enquire into the Small-pox and Fever Hospital Accommodation, that the Institute should give information or evidence upon the subject. A number of recommendations were drawn up at a Special Meeting of Council convened for the purpose, and Prof. F. de Chaumont, the Chairman, was asked to present them to the Commission. These recommendations included suggestions as to the size and arrangement of wards, the general construction, size and isolation of Small-pox and Fever Hospitals, arrangements for ambulance conveyance of patients, and the establishment of convalescent buildings. The Chairman attended before the Royal Commission, as requested, on the 27th January, presented the recommendations, and in the course of a somewhat lengthy examination explained the views of the Council on this important question.

The Council have prepared some recommendations on the Notification of Infectious Diseases to lay before the Committee of the House of Commons, now sitting to consider the Police and Sanitary Regulations Bills.

In July, 1881, a large Sanitary Exhibition was held at South Kensington, in connection with the Parkes Museum, and the Council considered that it would be of great interest and utility to place on record some account of the Sanitary Apparatus and Appliances there



exhibited. A *resumé* of the several exhibits has therefore been prepared, and will be incorporated in Vol. III. of the Transactions.

The Council are very pleased to acknowledge the contribution of a number of volumes to the Library during the past year, but would remind the Fellows and Members that the Library is as yet in a very imperfect state, and that any books relating to Sanitation will be gladly received. As it is desired to make it complete as a Library of reference, the older works on Sanitary matters will be acceptable as well as those of more recent date.

The next Congress and Exhibition will be held at Newcastle-upon-Tyne, September 26th, 1882.

This town offers every opportunity for a good Congress, and the Council trust that the Fellows and Members will endeavour to make the meeting even more successful than any of the preceding ones have been.

Finally, the Council would report that they have under consideration the establishment of Branches in various parts of the United Kingdom.

By order,

E. WHITE WALLIS,

*Secretary.*

9, Conduit Street, W.

May 17th, 1882.



# SANITARY INSTITUTE

## *Abstract of Cash Receipts and payments*

	£	s.	d.	£	s.	d.
To Balance at Bankers as per Pass Book of the Institute, December 31st, 1880, viz.:—						
Wyatt Edgell Fund .. ..	200	0	0			
Deferred Exhibits .. ..	80	17	7			
On General Account .. ..	215	5	0			
				496	2	7
„ Cash in Hand:—						
Cheques paid to Bankers after						
31st December .. ..	46	4	0			
Petty Cash .. ..	6	7	9			
				52	11	9
„ Donations .. ..				5	5	0
„ Fellowship Fees .. ..	147	0	0			
„ Admission Fees .. ..	33	12	0			
„ Life Compositions .. ..	63	0	0			
				243	12	0
„ Examination Fees .. ..				40	19	0
„ Annual Subscriptions .. ..	215	15	6			
„ Sale of Publications .. ..	10	14	11			
				226	10	5
„ Donations to Library .. ..				1	11	6
„ Cash advanced by Chairman of the Finance Committee .. ..				20	0	0
„ Loan from Exhibition Account ..				350	0	0
				£1,436	12	3

## EXHIBITION

To Balance 1st January, 1881 .. ..	282	5	11
„ Receipts .. ..	121	6	3
	£403	12	2

Audited and found correct with the Books of the Institute,

May 4th, 1882. MAGNUS OHREN, }  
ERNEST TURNER, } *Auditors.*

# OF GREAT BRITAIN.

for the Year ending 31st December, 1881.

By Expenditure:—	£	s.	d.	£	s.	d.
Office Furniture .. .. .	4	12	0			
Rent and Taxes .. .. .	47	0	2			
Salaries and Wages .. .. .	119	18	4			
Postage, Telegrams, and Carriage.	33	10	10			
Incidental Expenses .. .. .	46	19	11			
Stationery and Printing .. .. .	457	19	5			
Advertising .. .. .	17	6	4			
Ordinary Meetings .. .. .	87	10	0			
Examination Expenses .. .. .	27	10	4			
Law Charges .. .. .	2	12	0			
Library .. .. .	3	10	8			
Medals and Certificates .. .. .	8	15	0			
	<hr/>			857	5	0
„ Major McCoy, Balance due on Sus- pense Account .. .. .				16	1	1
„ Deferred Exhibits .. .. .				80	17	7
„ Repayment of Loan to Chairman of Finance Committee .. .. .				232	19	6
„ Balance at Bank December 31st, 1881—						
Wyatt Edgell Fund .. .. .	200	0	0			
General Account .. .. .	49	9	1			
	<hr/>			249	9	1

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£1,436 12 3

## ACCOUNT.

By Expenditure .. .. .	1	8	6
„ Loan to General Account .. .. .	350	0	0
„ Balance at Bank December 31st, 1881 ..	52	3	8
	<hr/>		
	£403 12 2		
	<hr/> <hr/>		



# “THE WORK OF THE SANITARY INSTITUTE OF GREAT BRITAIN.”

ADDRESS BY E. C. ROBINS, F.S.A., F.R.I.B.A.

*Anniversary Meeting, July 13th, 1882.*

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WE have now arrived at the Sixth Annual Meeting of this Institute, and, suddenly called upon to prepare the usual address, it has seemed to me a fitting time to pass in review *the objects of the Institute, the manner in which it has sought to attain them, and what is still left to be done.* The representative character of the annual addresses may be gathered from the following list of them:—

*Dr. Richardson* delivered the first address, “On the future of Sanitary Science in 1877.” *Frank Buckland*, in 1878, addressed you “On the Pollution of Rivers and its effects upon the Fisheries, and water supply of Towns and Villages.” *G. J. Symons*, in 1879, “On Water Economy.” *Captain Galton*, in 1880, on “The preventible causes of impurity in London Air.” *Professor de Chaumont*, in 1881, on “Modern Sanitary Science.”

It has been thought desirable that an *Architect* should address you in this year of 1882. There are several senior and more distinguished members of my profession to whose hands I could have preferred that this duty should have been entrusted, and to whom, indeed, I recommended the Council to apply; and it is only from their inability to comply with the invitation of the Council that, though a very busy man, I have consented to undertake the responsible task in question, and to occupy this prominent position in to-day’s proceedings with only a fortnight’s notice.

The *title* of my address has been chosen advisedly, because the very existence of the Society, as a separate organization, has been thought a questionable necessity by those who feel that in some sense it encroaches upon the domains of kindred societies. But I think I shall be able to satisfy all present that there was a very large field of usefulness left practically unoccupied until the establishment of this Institute. Every other scientific society is too much engaged with its own professional interests to take that constant oversight of the public weal in connection

with *public health* which this Institute has set itself to do. The position occupied by the Society of Arts, is, perhaps, an analogous one, but on a much broader basis. That Society looks after the interests of the public, as those interests are affected by the arts and sciences generally, by education and legislation, and whatever hastens or hinders the progress of our numerous industries and manufactures, or is concerned in the development of commercial enterprise. Its occasional conferences on sanitary questions have been most valuable and instructive, and may be said to have been indirectly the originators of this Institute, by showing the necessity of such an organization exclusively devoted to their study.

The Sanitary Institute is worthy of support and encouragement because it affords a platform upon which may meet the professors of every other scientific society whose special knowledge, as applied to the preservation of public health, may thus be brought to bear upon sanitary measures.

Upwards of 150 addresses and papers have been read at the various annual and ordinary meetings and provincial congresses since the commencement of this Society's labours only six years ago, one half of which have been written by members of the medical profession, whose special knowledge, so disseminated has led to the more perfect understanding and better classification of what may be termed preventible diseases, and localized their malevolent action by identifying the predisposing causes.

The principles thus enunciated and systematised have opened the way for the exercise of the ingenuity of others, and the remaining half of the papers read have been prepared by civil and military engineers, architects, surveyors, and members of the legal profession.

The respective scientific institutes to which these men belong are all more or less interested in sanitary questions, but it is not the *speciality* of any one of them, and therefore receives only occasional attention.

Whereas, by the establishment of this Society the earnest sanitarians may come forth from among them, and find a sympathetic audience, and a well-consolidated organisation through which such men may not simply ventilate their theories, but divulge their experiences, and propound their practical schemes for the amelioration of the insanitary physical conditions under which many of us are compelled to exist—some of us quite unconscious of the fact.

*The first object of the Society* is, therefore, to form into a nucleus, and enrol as members, all those whose minds have been exercised and enlightened on this subject of national health, and



whose talents and experience may be turned to good account, whatever their particular professions may be.

*2ndly.*—*The next* is to awaken the conscience of the country generally, and of its public men in particular, to the vast importance of preventive measures in arresting the spread of disease.

*3rdly.*—*And thirdly* to collect and impart information upon all matters connected with the subject of public health; and both directly and indirectly to influence the measures which may be adopted, and the laws which may be framed for the public good in connection with sanitary matters: the sanitary condition of this country being still very unsatisfactory, and further legislation being necessary, with a view to its improvement.

The *manner* in which the Society has sought to *attain* these objects is *threefold*, and appears to me to have been singularly successful.

*1st.* The reading of papers, their discussion and publication, with which is associated a distinguishing peculiarity of this Institute, viz.: Annual Congresses, held in different parts of the country, by means of which the whole country is awakened out of its sleep, and made to give a passing thought to the subject through the invaluable aid of the public press; while in the cities visited an excitement is produced, and an impression is made which is not soon forgotten, bringing together, as it does, the foremost men in each locality, who are interested in the subject.

Already Leamington, Stafford, Croydon and Exeter have welcomed the Institute, and held sanitary exhibitions, while the Congress lasted, at which valuable papers were read and listened to; and the earnest exhortations of veteran sanitarians of European reputation were well received.

Last year the Sanitary Exhibitions at South Kensington and at Eastbourne and Brighton made it undesirable to hold a fourth lest the public should be surfeited. This year, however, the arrangements for the usual Congress, which will be held at Newcastle, are completed. The local magnates will come forward as usual, and, under the presidency of Captain Douglas Galton, the Congress will no doubt be as remarkable a success as the previous ones have been.

This branch of the Society's work not only provides for the scientific discussion of papers in the three principal sections, but has an educational side in the shape of popular evening lectures and visits to sanitary works, complete or in progress. Some of the happiest efforts of Dr. Richardson have been prepared for these evening lectures.

2ndly. In connection with the Congresses, *Exhibitions* are held, and the Council appoint *Judges* to investigate sanitary appliances, to award medals and certificates, and to carry out detailed experiments by means of deferred practical trials, as to the value of the various forms of apparatus and appliances, which the public are invited to purchase, but the value of which they have few means of ascertaining beforehand.

The value of this branch of the Institute's work is obvious, and was ably enforced at Croydon, by Dr. Lory Marsh, who contributed a short Paper on the Technical work of the Institute.

3rdly. There is one most useful work undertaken by the Institute, of which I had long seen the necessity ; and as far back as 1854, as a member of the then "Metropolitan Sanitary Association," had strongly (though unsuccessfully) recommended that Society to inaugurate. I had just published "The practical view of the Sanitary Question," which detailed the work of a Local Board in St. Pancras, to which I was hon. architect and secretary; and Sir Benjamin Hall was engaged in getting his "Public Health Bill," and "Nuisances Removal," and "Metropolitan Local Management" Bills through Parliament at the time, after submitting the Nuisances Removal Act to our revision.

But the Sanitary Institute has realised my hopes, and has organised a *Board of Examiners*, to conduct examinations, and to grant certificates in sanitary science to *Local Surveyors and Inspectors of Nuisances*, and to persons desirous of qualifying themselves for such appointments, or of obtaining the certificate of the Institute.

The value of this enterprise cannot be too highly rated when it is remembered how inferior were the officers commonly appointed for sanitary purposes, and how few first-rate men there are still. As one of the delegates of the Royal Institute of British Architects present during the last two examinations, I have had opportunities of observing the sensible manner in which these examinations are conducted, avoiding all catch questions, and fairly testing the qualifications of the candidates.

*Dr. Carpenter*, in an inaugural address, alluded to the opposition which this Institute had met with from kindred societies, to whom he replied—"If we were proposing in any way to educate and examine men so as to fit them for the profession of an architect, of a surveyor, or of an engineer, there would be a reason for this antagonism; but it would be quite out of our province to propose anything of the kind, or in any way to come into antagonism with those bodies in their professional work. It is true that an architect ought to know the principles of public health, so far as they are connected with house-

building, and that an engineer should be acquainted with the principles of sanitary science, so far as they are associated with sewage and water supply; and that surveyors could not be fitted for their duties if they did not know how to advise a Highway Board or sanitary authority upon the right way to prevent nuisance. But these are the very points which the bodies in question have no means of knowing except from outside help, especially that help which is forthcoming from members of the medical profession and professed hygienists."

I agree with Dr. Carpenter, and will presently exemplify his meaning by reference to a few cases where the knowledge of the correct principles on the one side has led to correct practice on the other. I am free to confess, however, that I have not met with any members of my profession who are antagonistic to this work of the Institute, consequently I am disposed to think that the suggested antagonism has been somewhat exaggerated so far as we are concerned, and I think that the appointment of myself and Professor Lewis to represent the Council of the Institute of British Architects at these examinations is evidence of their appreciation and sympathy with this most important and practically useful branch of the technical work of the Sanitary Institute. At all events, I quite agree with Dr. Carpenter that "the importance of the *sanitary* duties which surveyors and inspectors of nuisances have to perform is more patent to medical men than to any other distinct class of persons."

But with regard to original research, I will now quote a few examples illustrative of Dr. Carpenter's contention, and of that important branch of the Institute's work which embraces the record and tabulation for convenient reference of those scientific principles most recently established, which underlie all practical sanitary operations. As he infers, the architect and engineer are competent enough to work out any detail of construction required, scientifically and practically, provided always the premises of the problem are clearly stated. It is to the philosophic enquiries and experiments of pure science, and to the experience and observation of that portion of the medical profession who have made a special study of what has been termed "preventable disease," in short, to *professed hygieists*, that we look for reliable demonstrations for our guidance, and of which the archives of the Sanitary Institute form the repository.

About two years ago I read a paper at the Royal Institute of British Architects, at the request of the Council, on "The Relation of Sanitary Science to the Practice of Civil Architecture;" and in the discussion which followed, Prof. Corfield remarked:—

"Mr. Robins has said that civil architecture can never be divorced from the experience of sanitary science. I would go

further than that, and would say that if it were not for the experiments that have been made by scientific men, no alteration in principle would be carried out, not only in architecture, but in everything else.

"If it had not been for the chemist, Pasteur, for instance, all the vine-growers in the world would never have discovered the cause of the destruction of their vines; the fowl-keeper would never have discovered the reason for the loss of hundreds of thousands of their poultry by chicken cholera; and the prevention of the silkworm disease would have remained an unknown problem. And he asked, What is it that has caused us to think so much of sewer air? There is one reason, and only one, and that is, that it has been shown by scientific experiment—by the experiments of sanitary science—that enteric or typhoid fever is produced by a constituent of that air; yet the public mind was not aroused to the necessity of preventive measures until one or two members of the Royal Family suffered from that disease."

It should be a subject of gratulation to this Institute that the Society of Arts has this year voted its Albert medal to Professor Pasteur.

Again, Professor Frankland, in his paper on "The transport of solid and liquid particles in sewer gases," read at the Royal Society, in 1877, thus summarises his conclusions:—

1. "The moderate agitation of a liquid does not cause the suspension of liquid particles capable of transport by the circumambient air; and, therefore, the flow of fresh sewage through a properly-constructed sewer is not likely to be attended by the suspension of zymotic matters in the air of the sewer.

2. "The breaking of minute gas bubbles on the surface of a liquid, consequent upon the generation of gas within the body of the liquid, is a potent cause of the suspension of transportable liquid particles in the surrounding air; and, therefore, when, through the stagnation of sewage, or constructive defects which allow of the retention of excrementitious matter for several days in the sewer, putrefaction sets in and causes the generation of gasses, the suspension of zymotic matters in the air of the sewer is extremely likely to occur.

3. "It is therefore of the greatest importance to the health of towns, villages, and even isolated houses, that foul liquids should pass freely and quickly through sewers and drain pipes, so as to secure their discharge from the sewerage system before putrefaction sets in."

To point the moral:—Dr. Frankland's investigations have proved that when water contains foul matter for any length of time decomposition takes place in the water, and the surrounding



air is contaminated by the bubbles of gas generated, breaking and releasing the infectious particles along with it, and thus it is that the architect learns, what he never would have discovered for himself, the necessity of devising means for the ventilation or disconnection, by air as well as by water, of the house-drains from the main sewer, which has led to the introduction of ventilating traps, and of intercepting cross-current air-ventilated manholes to house drains, even where water traps exist, to obviate the fatal consequences likely to ensue where neither air nor water traps nor manholes exist, which, nevertheless, is still the case in the great majority of dwelling houses in the land.

Through the influence, therefore, of Sanitary Science, as we understand it, mechanical contrivances have been devised whereby, as Prof. Corfield puts it, "a house may be brought into such a condition of safety, that we can say with perfect certainty that if typhoid poison is in the main sewer it will not get into the house; and further, that if typhoid fever is taken into the house, when such preventive measures are taken, it will not spread."

But this sound principle is not only applicable to *drainage*; it is most important to remember it in *water supply*. Thus Sanitary Science, having first revealed the ready absorption by water of bad gases, mechanical means have been devised by practical sanitarians to prevent the drinking water in our cisterns and wells from becoming contaminated. It was, and still is, common to find the only supply cistern fixed over the closets for the convenience of having the ball levers and service boxes in the same for their supply, and the trumpet shaped overflow waste pipe, untrapped, was fixed in direct communication with the soil drains—through which, sewer air was laid on to the surface of the drinking water to be absorbed by it, and to poison the unconscious family drinking the same. All this is being amended now. Separate cisterns are provided for drinking water. No water can be drawn from those supplying the closets. Every cistern waste discharges into the open air over a trapped gully grating. Galvanized iron or slate cisterns being preferred to lead, and tin lined lead pipes serving the various supply taps.

Our able Chairman of Council, Prof. de Chaumont, assures us that parallel with the progress of medicine and the collateral sciences, advances have been made in Sanitary Science which amount to important revelations, so that it has become possible to lay down certain principles which are capable of practical application to the great advantage of us all. In short, the ablest medical and sanitary authorities have decided that by good sanitary appliances and surroundings, resulting in the maintenance of the

purity of the air within and around our dwellings, typhoid fever, diphtheria, sore throat, and cholera might be rendered exceptional diseases, instead of being, as they now are, the fruitful sources of illness and death, to the alarming extent of one-third of the whole mortality of the United Kingdom.

In further illustration of the uses of sanitary science, as it has been formulated by the experimental researches of professors of physics, chemistry, and hygiene, the popularization of which researches is the special work of this Institute, let me detail to you the experiments of Dr. Pettenkofer and Dr. Renk at the Hygienic Institution at Munich. Dr. Renk, in a letter promising to send me a pamphlet in which he has laid down his opinion of sewer gases and the hygienic estimation of them, also some hints how to keep them out of our houses in a better way than has been done hitherto, proceeds to give me a description of his experiments on "the entrance of ground air into houses." By means of a differential manometer, invented by Recknagel, he discovered that, in a house at Munich, the air in the ground beneath the paving of the cellars was always under a higher pressure than the air of the cellar itself, from which result he inferred that the ground air is always in motion from the soil into the house—the pavement being bricks laid in mortar was permeable by air. This higher pressure of the air under the house he found was caused by the wind and by the difference in temperature between the inside and the outside of the house.

It happened that in and under the cellar paving a draught channel for ventilating purposes was situated, being constructed of bricks and mortar, and covered with stone slabs. The channel was connected with the chimney of the boiler which generated the steam for the heating apparatus. This draught channel had a very great influence on the ground air to a distance of six yards from its walls, and the ground air was more attracted by the current of air passing through the draught channel than by the air in the basement of the house. Moreover, the air of the cellar was in like manner, for a certain distance from it, drawn into the same draught channel current, and with increasing rapidity the nearer it approached the channel.

This experiment suggested to Dr. Renk a means of keeping ground air out of houses—that is, by permeable tubes connected with the chimney of the kitchen fire, up the flue of which a constant current is being kept up, thereby a sufficient draught is created to withdraw the ground air from the soil and carry it above the roofs.

In connection with these experiments were others illustrating its passage through walls of houses of different materials, from

which tables of data are derived, which give to the architect and engineer the means of calculating the degree of permeability for air that the materials he employs possess.

It is my practice to avoid boarded floors on basements, and the air spaces under them required to prevent dry rot. It is better to cover the whole area of the ground covered by the house with a layer of cement concrete 6 inches thick, which is practically impervious to air or moisture, and to lay thereon a wood block pavement formed of burnettized blocks  $7 \times 3\frac{1}{2} \times 2$  inches thick, with wrought edges and top surface, set in pitch and jointed with cement powder brushed into the interstices, and set with water.

The architect to the Ecclesiastical Commissioners, Mr. Ewan Christian, first suggested and carried out a plan for rendering walls impervious—by simply building the enclosing wall of a house with a hollow space of about an inch, and pouring into the same liquid asphalte, thus forming a vertical damp course, rising from the horizontal asphalte damp course commonly laid in walls 3 inches above the level of the ground to prevent damp rising in the walls themselves.

So far we have been considering the helpfulness of sanitary science in relation to sewer gases, and the ventilation of drains, water supply, and the withdrawal of ground air from the basements of houses. But when we have succeeded in ventilating our drains, water, and subsoil *out* of our houses instead of *into* them, we have still to consider, as I showed in my lecture at Eastbourne, on “The Revelations of Sanitary Science,” how to maintain the purity of the rooms we inhabit and deify with our own breathing, house warming, lighting, and cooking.

Here again the architect and engineer are aided by the researches of medical men. The late Dr. Parkes has shown and figured in great detail the various sources of impurity to which the air of enclosed spaces is subject, and the particular diseases to which the inspiration of such impurities give rise; and he has given a means of testing the constituent parts of the air, and formed tables for the guidance of professional men, in which work Prof. de Chaumont was associated with him.

It is usual to measure the impurity in the atmosphere by the proportion of carbonic acid gas it contains—not because it is the only, or even the chief cause of its unhealthiness, but simply because it is measurable, and is indicative of the proportional existence of other impurities, to which, in fact, it forms an index. The necessity for *change* of air having been proved, scientific and practical men have set about trying to achieve it, with varying success, but in all cases it is obvious that inlets for fresh air must be accompanied with outlets for foul air, so

rarified by heat, as to maintain an upward current in the shaft therefrom. I might go on adding example after example *ad nauseam*, but I have given sufficient instances of the great value to practical men of the researches of other men in Sanitary Science to show the valuable nature of the work which the Sanitary Institute of Great Britain has in hand.

We have now seen that the objects of the Institute are sufficiently unique to warrant its separate existence, and that the manner in which it has sought to attain those objects is sufficiently comprehensive. We may now consider briefly *what remains to be done*.

In the first place, it occurs to me that, with respect to the Examinations conducted by the Institute, it may soon be necessary to consider the extent to which some technical education should eventually be required as a condition precedent to such examination, if the standard of efficiency for the offices of Local Surveyor or Inspector of Nuisances is to be permanently raised. Of course the emoluments must correspond, and be made commensurate with the qualifications demanded, and the independence of the officers must be better secured than it now is, both by the public and its representatives, the parochial authorities. But I do not propose to enlarge upon this branch of the subject, which has been well ventilated at the ordinary meetings of the Institute, but I hope some practical legislation will follow the general opinion formed, that responsible officers ought not to be subject to irresponsible representatives of vested interests, opposed to the spirit of the public health and nuisances removal acts.

To raise the standard of efficiency, qualifications of candidates for diplomas should not simply depend on the replies written or oral to a few test questions of the examining body, but by some evidence of preparatory study, as shown by previously acquired certificates of elementary general competency.

The Conference of the Society of Arts, on Technical Education, of 1868, thus expressed itself:—

“Believing that our defects are far more due to the ignorance of those who direct works than to imperfect technical education, want of skill, or incapacity in those who execute them, we consider—That with a view to the development of a system of scientific education, it is desirable that schools be established, having for their main object the teaching of science as a mental discipline. These science schools should prepare some youths for the higher courses of a college, and other less ambitious pupils for their professional pupilage.”

Now, as I have elsewhere stated, in England all the best things are reserved for the upper ten thousand, and because a



classical education was associated with a refined culture, therefore all our public and private schools became preparatory schools for the universities, as if the whole country consisted of noblemen and county families, to the entire neglect of the scientific necessities of the period.

The thorough mastery of any one branch of higher scientific education, to the extent to which the dead languages or pure mathematics are now carried in the universities, would be found a full and sufficient means of mental expansion, but the absence of efficient teachers to an equivalent extent will long stand in the way of such a development.

But I am happy to think that contemporaneously with the spread of knowledge in sanitary matters in particular, has come a feeling of backwardness in technical education generally, and during the last five or ten years, science schools of the character suggested by the Conference of 1868 have been built, and are being erected throughout the country, by municipal authorities, as at Nottingham; by trade guilds, such as the City Companies of London and Bristol; and by private benevolence, of which Josiah Mason's College, at Birmingham, is an eminent example; so that very soon the means of obtaining technical information will be within the reach of every man worth his salt.

The proposed introduction into the ordinary curriculum of our primary schools of such elementary, scientific, and practical courses as may help towards the development of individual cleverness, by a general raising of the technical standards, and a selection of the fittest for higher training, cannot be otherwise than eminently desirable, and will leave no excuse for any candidate for examination being entirely without that preparative training which is, or should be, the aim of all test examinations to foster and encourage.

The recent establishment of compulsory examinations for admission to the Architects', Surveyors' and other Institutes, will certainly help to bring about a change in this matter, and soon it is to be hoped that, just as candidates for entry to the technical educational advantages to be hereafter obtained at the Central Institution of the City Guilds will be required to produce certificates of having passed preliminary examinations at other schools of lower grade, so admission to the examinations of our professional institutes should be ultimately given only to such students as shall be able to produce similar educational certificates of competency up to a certain point, which can only be fixed from time to time, as the means of obtaining such certificates shall have been increased.

As time rolls on, therefore, I trust that the Sanitary Institute will see its way to require some guarantee that the persons to

whom it grants its diploma are not only acquainted with the letter of the law, but are qualified to carry it out, by previous training, as well as the capacity to get through a special examination.

Concurrently with the advantages offered to young men for improving their general technical knowledge, and in due proportion to their general accessibility and extension, should the fulness of the topics for examination be increased, or the evidence of previous study be required, so that the general standard may be raised. This, of course, will be a very gradual process, but it is one that must be borne in mind if the credit of the Institute is to be maintained, and the value of its diploma permanently established.

I may here observe that a chair of Hygiene is associated with some of the foreign universities.

In my recent tour of the technical schools on the Continent, I visited a very remarkable institution in Munich, founded by the King, and entirely under the control and management of Dr. Pettenkofer, one of the Professors at the University, from whose plans it was built and fitted up in a sumptuous manner, replete with every apparatus and appliance. It is called the "Hygienische Institut," and I spent several hours with his chief assistant, Dr. Renk, by whom I was taken through the physical and chemical laboratories, and shown the various experiments on ground air, which I have already detailed to you, and which he had been two years in working out.

It is to this institution that officers of health have to repair and complete their courses before being considered properly prepared to undertake responsible official positions in relation to the public health.

And it would be a gratifying circumstance if, in the legislative enactments of this country, something besides the mere appointment of officers should be required; and that certificates of competency from an appointed tribunal should be required of all candidates for office under the Public Health and Nuisances Removal Acts.

And it may not be too much to hope that, just as no district surveyor can be appointed under the Metropolitan Buildings Act unless he shall have first passed the compulsory examination entrusted to the Royal Institute of British Architects by that Act, so the certificate of the Sanitary Institute of Great Britain shall be, by law, required of all would-be officers of health.

2ndly. This brings me to the consideration of some points in which sanitary legislation seems to need improvement. But first let me remark that it would be a very narrow view of the

work of the Institute if it were to show towards others the same jealousy which it has deprecated in its own case. The Sanitary Institute should be ready to aid to its utmost all efforts for the improvement of the sanitary condition of the masses. There are many philanthropic schemes afloat which it should be the pleasure of this Institute to assist and encourage by its sympathy and advice, and otherwise as opportunity may occur, and by the personal co-operation of its members.

The National Health Society, The Ladies' Sanitary Association, The Parkes' Museum, The Sanitary Protection Association, the Sanitary Assurance Association, etc., etc.:—these societies have collected funds and formed valuable and influential coteries of the patrons and patronesses of sanitary work, whose hearts and whose purses are open to the appeal of those whose slender means would deprive them of the advantages of good sanitation, if it were not for the co-operative principle underlying the two latter societies' labours, and enabling them for a small fixed fee to give the professional advice required.

The fact that a few rich people, who could afford to pay for more elaborate reports and supervision, may also seek to obtain these advantages ought not to influence our judgment of their general usefulness and value.

Mr. H. C. Stephens has shown, in an ably written paper, the way in which the law, as it now stands, operates as an obstruction to sewage disposal. He has shown that under the Public Health Act of 1875, owners and occupiers derive rights which prevent local sanitary authorities from carrying out systems of drainage involving the *separation of the rainfall and surface water from sewage*. The bad effects of the present system have necessitated the appointment of a Royal Commission to consider if any, and what steps can be taken to lessen the evils attendant on the present outfall arrangements of the metropolitan drainage.

The 10th clause of the abstract of Mr. Stephen's paper puts the matter clearly, thus:—"Though, under the 24th section of the Public Health Act, it is competent for local authorities, at the expense of the ratepayers, to alter or construct anew the drainage of houses, if such drainage is not adapted to the general sewage system of the district, there is, notwithstanding, no power in the Public Health Act, or elsewhere, enabling local authorities to decline to approve plans by which excreta and house waste, with the rainfall combined, are shown to be received into carriers common to all."

So long as the rainfall accompanies the waste and soil drainage, so long will the impracticability of economically converting the latter into agricultural uses remain. Consequently, a sanitary

measure of urgency and importance is rendered impracticable from rights arising under the Public Health Act.

The combined system of drainage dates from the Fire of London, after which it was first instituted. But as London grows, the difficulties will increase, and are increasing, and sewers, forming elongated cesspools in dry weather must increase in number, till the time comes when Prof. Corfield's suggestion will be the only cure remaining for great cities—that is to say, the old sewers shall be exclusively used for rainfall, and a new system of soil drainage on the latest principles of sanitary science, with complete and constant flushing arrangements, automatic in action, shall be constructed.

The provisions of the Public Health Act should be broad enough to allow of the trial of this "separate system" on a smaller scale than will eventually become necessary.

*Again*, so long as we hold to any water carriage system, and none is so readily adaptable to householders' uses, a good supply of water all the year round is an absolute necessity, whether it is constant or intermittent is of much less consequence than is commonly supposed. The enforced use of waste-preventers has so improved their manufacture, that a sufficient flush can be obtained in spite of their use, and the regulation of the size of the service pipe from the cistern, in proportion to the height above the closets, will effect all that is required in a house.

But the influence of the Institute may be beneficially used in favour of the public, and especially the humbler portion of it, by getting a revision of the Water Companies' Act, which has granted to them inquisitorial powers for self aggrandisement, quite inconsistent with public purposes of a sanitary nature.

I do not enter into the question of the cost of the water, which should obviously bear some relation to the quantity supplied, and not rates and taxes, that is likely to be taken up more effectively by other bodies than this Institute. But I do contend that so long as a house is supplied by cisterns filled once a day, the Water Companies have no right to interfere in the use of that water so supplied. Where there is constant service, and no intervening cistern, it may be necessary to look to every point at which water may escape; but the inconvenience of leakage from high pressure is its own punishment for indiscretion in the use of imperfect apparatus.

As the case now stands, difficulties are thrown in the way of using water, the result of which is that an insufficient quantity is used for the purposes of a healthy water carriage of the excreta of dwelling houses, rendering more than ever necessary the proper ventilation of sewers and drains.

*Another*, and a pressing want of the day is greater uni-



formity in the bye-laws governing the action of local authorities. This subject has been well thrashed out at the Royal Institute of British Architects in London, as well as provincial architectural societies, and has been the subject of annual conferences, and is likely to be re-opened at the next conference of the Royal Institute.

The inconsistencies at present prevailing are very perplexing, and even the model bye-laws of the Local Government Board are open to considerable improvement; but the subject is too large and technical to enter on at this time—one instance in my own practice is enough.

In Croydon I was required to make my house soil drains 4 inches diameter to enter 6 inch pipe sewers. In London we commonly use pipes 6 inches diameter. At Bristol no drain from any single closet is allowed to be less than 9 inches diameter: a difference of from 12 to 54 inches in the sectional area for the same purpose, or nearly five times.

I hope I need not apologise for having confined my attention more particularly to those points which are more especially interesting to me as an architect. The time at my disposal is too limited to allow of my entering at any greater length upon the question of the legal disabilities under which sanitarians feel reſtricted; nor is the occasion one on which it is necessary that I should do much more than indicate the direction in which the work of this Society may be profitably employed in the remedy of existing defects and abuses, legal or otherwise.

But I am perfectly sure that in proportion to the public spirit manifested by its members, in the same proportion will they acquire (as they will deserve) the support and countenance of the whole community.

I must apologise for the superficial quality of this paper; I do not offer it as an example for imitation, but rather as the hearty contribution of one of its well-wishers, to the popularisation of the objects, action, and aspirations of the Sanitary Institute of Great Britain.

# REPORT ON THE INTERNATIONAL MEDICAL AND SANITARY EXHIBITION, 1881.

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At the close of the International Medical and Sanitary Exhibition, it was decided by the Council of the Sanitary Institute of Great Britain, that some record of the various Sanitary Exhibits should be perpetuated for the members' future reference. A small committee, composed of Prof. de Chaumont, Dr. A. Carpenter, Mr. H. H. Collins (who acted as Chairman), Dr. H. C. Bartlett, and Mr. E. C. Robins, was formed for the purpose of carrying out this decision. Several members of the Council undertook to aid in the preparation of the Report, and were most ably assisted by Mr. J. Wallace Peggs, who has spared neither time nor trouble in order to render the information he had acquired useful and valuable.

It became necessary in determining the enumeration of the Exhibits to adopt some rule as to the scope of the Report, inasmuch as there was necessarily a large number of Exhibits which, although of great practical value and of ingenious invention, were not in any way novel. The Committee, therefore, determined to report specially only on those which had the recommendation of being modern, or recent improvements, or else novel in arrangement: this will account for the omission of many exhibits which otherwise would naturally have found a place in the Report.

The Council do not identify themselves in any way with, nor do they hold themselves responsible for the statements of facts or expressions of opinion which may be found in the following pages; the merits of the exhibits having been fully entered into by the competent judges who were appointed by the Council of the International Exhibition to report and adjudge thereon.\*

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## SECTION XIII.

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### DOMESTIC AND HOSPITAL ARCHITECTURE.

#### PLANNING, CONSTRUCTION, DECORATIVE MATERIALS.

THE chief feature of this section, it will be observed, consists of the large number of architectural drawings showing the construction of Hospitals, Pauper Infirmarys, and Special Hospitals for specific

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\* A List of the Award was published in the Catalogue.

diseases, Workhouses, Lunatic Asylums, Orphan Asylums, and Schools.

There are also exhibits of drawings for the reconstruction of University Hospital, London, and designs for constructing hospitals on Professor Marshall's system of circular wards.

Before proceeding to give any description of the various buildings, it may be interesting to remark that the isolation of sick wards by a ground floor connecting corridor running at right angles with the axis of the wards, forms what is called the "Pavilion System." This system of construction was adopted by Mr. Worthington for the Chorlton Union, near Manchester, and was, we believe, the first example in this country of the pavilion principle.

This system has been generally followed in the exhibits we are considering. The space allowed between the pavilions is a matter of much importance, and it is usually considered that this should be not less than twice the height of the pavilion.

The cubical contents of each ward varies with the nature of the disease to be treated, and is fixed for all public buildings. Voluntary Institutions commonly give more cubic space than Public Institutions. The cubic space, however, should not be obtained merely by increasing the height of the wards at the expense of the floor space. The Cubic Space Commission have recommended that six feet of wall space should be allotted to each bed, and considerably more for infectious diseases.

Single separation wards are to be provided for removing cases that for any reason may require separation.

Space should also be given at the end of the ward, or in the width of the ward, for allowing convalescents to move and sit about when no special convalescent wards are provided.

The sick ward is in every hospital design the feature of interest, and is first thought of. Its axis should be nearly north and south, and where the ward is long and lighted by opposite windows, it should have a width of 24 feet, with the beds singly or in pairs between the windows.

Mr. Saxon-Snell has, in some of his buildings, made an exception, having no windows on the same side of the ward as the beds, but lighted from the ends by opposite windows, care being taken not to make the wards too long. The cross ventilation so obtained is less likely to be injurious to the patients, while the absence of bright light immediately opposite is more agreeable to the eyes. These wards of Mr. Snell are applicable to poor law administration where less serious class of cases may be treated.

The cheerfulness of wards so constructed is scarcely the same as those lighted on both sides; and, we notice that Mr. Robins in his design for the North Staffordshire Infirmary, has felt the importance of this point, and provided bay windows, V shaped on plan, with low sills, so that patients may see out of them as they lie in bed.

The plans exhibited generally provided the usual ward nurse's bed room and scullery at one end, and the baths and water-closets at the other end. It may be well to remark here, that the recent practice

is in favour of the ward nurse's bed room not being attached to the ward, but that nurses should have their room in the administrative block. The ward nurse when on duty should be in the ward, and when off duty is better away from the ward.

The cross-ventilated lobbies dividing the water-closets and bathroom from the ward were variously designed, but those having means of heating by hot water pipes or otherwise, must be considered better than those not heated; for patients are not likely to take a chill in passing into the warmed apartment.

Various systems of heating and ventilation were shown. Open fires were generally adopted, but aided by heating apparatus independent of the fires, except in the case of some of Mr. Saxon-Snell's buildings which had his patent Thermhydric stoves, combining the open fire with hot water circulation, the heat for which is obtained by the same fire.

Admitting fresh air over heated surfaces at the lower part of the room, and extracting the vitiated air by vertical shafts in the upper part of the walls is the system most generally adopted.

The velocity is sometimes accelerated in these shafts by heat applied at the foot of the shaft over the chamber with which it communicates.

The question of ventilation for large buildings is quite in the experimental stage, and in order perfectly to control the proper and efficient supply of air to wards, special power may have to be provided.

The question of summer ventilation when cool fresh air is required, and that of winter when warm fresh air is required, have both to be considered. Mr. Robins has expressed his opinion that fans, either to withdraw the vitiated air, or to force in fresh air, or both as may be required, are the proper means for obtaining the change of air necessary in large buildings.

It may be well to note here that great care should be devoted to the selection of the intake of fresh air so that it may be pure.

A reference to the more important buildings may now be given.

#### No. 84. GALTON, CAPTAIN DOUGLAS, R.E., C.B., D.C.L., F.R.S.

*The Herbert Hospital, Woolwich.* This hospital, built on the western slope of Shooter's Hill, was designed for 650 patients. The wards range N.N.E. and S.S.W., and are in single and double pavilions, which connect by a corridor 715 feet long and 15 feet wide. The pavilions are 63 feet 9 inches apart, and are in three stories. The greatest length of the pavilion is 312 feet, and the ordinary wards are 117 feet 8 inches, 108 feet 6 inches, 73 feet 8½ inches long, 27 feet 6 inches wide, and 14 feet high. The principles embodied in this building are now well known and appreciated, so that it will be unnecessary to follow them here in detail.



## No. 56. SNELL, H. SAXON, F.R.I.B.A.

This is a very complete series of drawings illustrative of *Parochial and Charitable Institutions*. The drawings include *Workhouses, Infirmaries, Schools*, and many other institutions which have been erected by Mr. Snell. The list of all the institutions of which drawings are exhibited will be found in the Official Catalogue, International Medical and Sanitary Exhibition, 1881.

In the *St. Olave's, St. George's, and St. Marylebone Infirmaries*, the usual arrangement of hospital building with narrow wards separated by wide open spaces is shewn. The beds are arranged along each side, and the nurses' room, sculleries, &c., at the end next the corridor connecting the ward with the administrative block and other wards. The lavatories, baths, and w. c.'s are placed in a tower at the extreme end of ward, and separated therefrom by a ventilating lobby.

In the *Infirm wards of St. Marylebone*, and in *St. Luke's Workhouse Infirmary*, a very different arrangement to the above is shewn. Here the wards are more than 40 feet wide, and the beds are placed against the end walls, and back to back against the partitions running partly across the ward from one side, and about two-thirds the height of the ward. The other side of the ward is built into a series of bay windows, around which are seats for the inmates, and this space forms the day-room. The nurses' and officers' rooms are placed at the ends as previously described.

In *St. Marylebone Infirmary* the circumscribed area of the site has made it necessary to accommodate the laundry on the upper floors. The washhouse is on the topmost floor (3rd floor), the drying ground on the 2nd floor, and the laundry on the 1st floor. The linen to be washed is sent up by a lift from the ground floor, and passes down through the various processes, and finally to the delivery room on the ground floor again.

The *Holborn Infirmary*, erected at Highgate, shews both the above systems combined in one establishment. The administrative block in this infirmary is placed somewhat differently to the usual manner.

Workhouses form a class of work corresponding to the above, and are illustrated by *St. Luke's, St. Marylebone new casual-wards*, and the alteration and additions to *St. George's Workhouse*.

The list of parochial buildings is continued with *Hendon Union Lunatic Wards*, and a comprehensive set of buildings for the *Clerkenwell Mortuary*. The part of the building over the disinfecting chamber is carried up as a tower with a flue for conveying any noxious vapour away from the disinfecting chamber to the highest part of the building.

The Dispensaries for the northern and southern districts Marylebone give the same accommodation, but are rather differently planned owing to the difference of site.

The lodgings for houseless poor, designed for a Russian Philanthropist, to be erected at Nijny Novgorod, are planned on the same principle as casual wards.

The School buildings are represented by *Industrial School* for 437 and 628 children respectively, and by the *Kensington District Schools*. The latter design shews a careful separation of the different classes of children. In addition, there are the usual buildings arranged for probationary wards for both boys and girls and infants. This design also includes an infirmary and a chapel.

The *Royal Patriotic Fund School* for boys, erected on Wandsworth Common, is designed for 180, with infirmary accommodation for 14. The area of the site is 12 acres, and includes play ground and cricket field.

The detail drawings exhibited by Mr. Snell are interesting, and shew the isolated tower building containing the w.c.'s, bath, and lavatories. The chambers are heated with hot water pipes, so that air would be rather drawn in from the wards than delivered into them.

The ward windows are designed so as to protect the occupants of the adjacent beds from draughts when open. The upper part is made as a sash to let down. The window is close up to the ceiling, and has a box space provided for the Venetian blinds.

The system of *circular wards* suggested some years ago by Professor Marshall is shewn, worked out for an infirmary, by Mr. Saxon-Snell. The unlimited supply of air to a sick ward is a cardinal consideration. The square court enclosed by the buildings is the worst form of construction. The circular ward offers many advantages, as it receives the wind from every direction, and is quite detached and well aerated. The circular ward for the amount of material used gives more wall space and greater cubic capacity. The sharp cross draughts and down draughts as in ordinary wards would not be so great in the circular construction.

The height of the tower wards in towns should be arranged for two or three stories, and the towers built on arches below might be finished at the top with a winter garden. No direct communication would be given between the towers, access being only indirect through a corridor. The cost, according to Mr. P. Gordon Smith, would be slightly greater than ordinary pavilion construction, with a corresponding number of beds and equal ward space per bed.

#### No. 62. ROBINS, E. C., F.S.A.

This exhibit comprised designs for the *North Staffordshire Infirmary*, the *Coventry and Warwickshire Hospital*, and the *St. Pancras Infirmary*, all illustrating various applications of the "*pavilion system*" of planning.

His premiated drawings for the London Orphan Asylum were exhibited to shew the application of the same principle to an orphan school. The quadrangular form of the uniting corridor connected complete homes for 25 boys in each block.

Mr. Robins also exhibited his design for the City of London School, wherein he has worked out the so-called "*Hall passage system*," which

he recommends for the planning of middle class day schools, all the class rooms being entered from the great hall.

#### No. 91. TOLLET.

The chief features of the system of hospital construction, now known in France by the name of the Tollet system, are the separate pavilion exposing as large a surface as possible to the purifying influence of the outer air, and as little interior surface as possible to the contaminating influence of the internal air.

The most important hospital on the Tollet system is that at Bourges, which contains 220 beds, and it may give some idea of the system by adding here a short description of this hospital.

The hospital is situated on a gentle slope, and covers about 15 acres of land, or 2,582 square feet of land per bed. The Bourges hospital consists of twelve one-storey "ogival" pavilions, with a distance of 52 feet between each. The principle adopted is to have the space of ground between each of the pavilions equal to twice the height of the pavilions. The pavilions are 120 feet long and 26 feet wide, and the floors are raised 5 feet above the ground. The roof has been the subject of special study, and the pointed arch has been adopted, it being considered that this form would harbour the least dust and dirt, and having no tie-beams or obstructions would offer least surface, and give great facility for ventilation of the ward. The framework of the hospital is of iron ribs placed 4 feet apart, and curved over to meet in the point of the arch. The spaces between the iron ribs may be filled in with boards, or for more permanent hospitals, with stone or brickwork. The walls and the floors of these buildings receive careful consideration. The interior walls are prepared with silicate cement so as to be smooth and non-porous, and they can be washed, and when desired they can be coated with petroleum and burnt off so as to destroy any germ life. The floors are of wood, but covered with a material impervious to moisture and with joints caulked, so that the hospital dust does not sink in. At the end of the pavilion facing the entrance there is a door opening into a vestibule severed from the main building by a covered passage open both sides, 9 feet long. The closets are placed here, and under the same annex there is a cart to receive soiled linen, so that it is at once removed from the building. There is a small separate room at each side on entering the pavilion, one for the nurse and the second for any patient it may be considered desirable to separate. At the other end of the ward there is a small dining room, a bath room, and small kitchen.

#### No. 65. BOOTH, LAWRENCE, F.R.I.B.A.

The *Salford Union Hospital*, built in 1880, has a site 310 yards long, 85 yards in breadth.

The pavilion principle was adopted, and a continuous corridor

850 feet long, 10 feet wide, connects the several pavilions with each other, and with the administrative block, which latter is placed in the centre so as to be easy of access. The corridor is enclosed on the ground level, but the two upper stories form open gangways for communication to the several blocks. In favourable weather these gangways form a pleasant resort for convalescents to enjoy fresh air, and the view of scenery which is very beautiful at this point. Additional staircases are provided for double pavilion blocks for occasional use or in case of fire. In connection with these staircases there are open air balconies for semi-convalescent patients. All water-closets, bath-rooms, and lavatories are cut off from wards and day room by intervening passages open on both sides. The pavilions are well detached by wide spaces for ventilation. The wards average 80 superficial feet floor space, and 1,000 cubic feet of air or ventilating space for each patient. Sash windows to open to fullest extent, and at the head of all ward windows there are swivel casements to form hopper for judicious admission of fresh air. At every floor level hit-and-miss ventilators and ziz-zag flues are provided. Each department has its linen shoot, coal cellar, lift, nurses' kitchen, and also special adjacent wards for occasional patients. In addition to 10 small lifts for ordinary purposes, there are two large ones from the operating rooms for men and women patients and attendants. The wards and day rooms are all warmed by open fire grates constructed somewhat on the "Galton" principle. There are two distinct systems of drains: one for conveying roof-water into a tank, for washing purposes, the other for carrying sewage matter into public sewer.

The further exhibits under this number are the *Workmen's Dwellings*. These dwellings have been designed to provide independent households for very poor people at a rent of 2s. 6d. per week. The large "flat" system has been avoided, but what may be called "semi detached cottage" system has been adopted. Blocks, three stories in height, containing two tenements on ground floor, two tenements first floor, two tenements on top floor placed seven feet apart along the street frontage. Uncovered staircases of fire-proof construction are provided between the blocks for access. It is intended to give 30 feet between the backs of houses, not walled off but left open. The internal accommodation: living room, 12 feet by 12 feet; bed room, 12 feet by 10 feet 6 inches. The warming and ventilation have been carefully considered. The waste heat from sitting room warms the bed room. Floors of living room concrete, and walls lined with glazed bricks, 5 feet high, and may be washed easily. The bed room floors are of wood, and ceiling lath and plastered. No walls are plastered, and there are no skirting boards. All the walls and ceilings are lime whitened.

No. 59. POORE, DR. G. V., AND A. WATERHOUSE, A.R.A.

These drawings shew a scheme for the reconstruction of *University*



*College Hospital* on its present site. The main principle insisted upon is that each pavilion should be a building complete in itself, and making it impossible to pass from one pavilion to the other, from one storey to another, or from one ward to another without going into the open corridor. The building resembles the letter E, and has the three pavilions pointing to the open space of the college. Every part of the building is thus made to have advantage of what fresh air there may be in this space. The pavilions are connected at their western extremities with open corridors.

The building is five stories high, and stands about 63 feet above the pavement. The three stories devoted to wards would be exclusively for patients, and each pavilion would contain three wards. All the wards are 25 feet wide, and the length of north pavilion 120 feet, centre pavilion 80, and south pavilion 88 feet. A floor space of 120 square feet would be available to all patients, children as well as adults, giving accommodation for 174 patients. In addition there would be 24 beds in private wards, making 198 in all. The w.c.'s and sculleries are in turrets slightly projecting at each end of the pavilion. Every thing that may give rise to offensive emanations, or for which light and air are specially required, is placed in the top stories. In the north pavilion, dead house, and post mortem room, communicating by a special lift with the back yard; the Registrar's rooms, urine laboratory, dispensary laboratory, and clinical lecture theatre. In the middle pavilion the operating theatre, and in the south pavilion the kitchen is placed. The corridors are eight feet wide, and the staircases in separate buildings six feet wide, and in the centre of each a lift going from top to bottom of the building.

#### No. 64. ERNEST TURNER, F.R.I.B.A.

Exhibit of drawings shewing method of *drainage for town houses*.

The *Fever Hospital*, Newton Road, for the Local Board, Torquay.

The *London and Provincial Steam Laundry*.

The *Home Hospital*, Fitzroy Square.

The drainage plans shew houses of various types where of necessity the main drain passes underneath the house, and in such cases great care is required to make the drain perfectly watertight. In the houses under consideration the drains are laid in a bed of concrete, and are carefully jointed. The ventilation and aëration of all drains is also a matter of great importance, and is accomplished by admitting fresh air in front of the house in suitable positions, and withdrawing at the back of the house by a vertical ventilating shaft. By this means a current of air is continually circulating through the drains, rendering them free from sewer air.

The *Fever Hospital*, Torquay, was designed to meet the requirements of the Local Board, the object being to provide a building complete in all its sanitary arrangements, of moderate size, and at the lowest cost. The idea was, by isolating the first cases which

appear, that it might be possible to prevent a disease from becoming epidemic.

Accommodation is provided in this hospital for twenty patients in eight wards, four wards containing four beds each, and four single-bedded wards. The drainage is not carried into the town sewers, but is dealt with in two ways, the earth closet for excrement disposal, and subsoil irrigation for the slop waters from baths, sinks, &c., which are collected into a Field's flush tank, from which they are automatically discharged into drains with open joints, which allow of percolation into the ground. The rain-water is collected for use in the laundry, which building is situated in rear of the main block, and comprises wash-house, ironing room, and disinfecting chamber.

At Fitzroy House the Home Hospitals' Association made the first effort to provide accommodation for a special class of patients whose circumstances placed them without the scope of charitable relief. The house, which was an ordinary town house of the early part of the present century, has been modified and adapted for the purposes of this hospital. The entrance is by a broad, well-lighted hall, from which the dining-room is approached, and behind this is a bed-room appropriated for an accident ward. The upper floors are entirely occupied by bed-rooms, and on the landing, between the first and second floors, is a bath-room and water closet. The range of buildings at the back of the premises, originally used for stabling, have been converted into nurses' bed-rooms. The walls, whenever possible, have been rendered washable, and all floors are stained and wax polished.

Special attention has been given to the drainage arrangements. The main house-drain runs from the back through the basement passage into the public sewer. Manholes are provided at back and front on the drain, and fresh air is admitted by two inlets in the front area, and the soil pipe is carried up as an exhaustor shaft at the back of the house well above the roof. Flushing arrangement is provided at the back manhole.

The London and Provincial Steam Laundry. These works, which have been recently opened, are the largest of the kind, and are designed for dealing with from 80,000 to 90,000 pieces per week.

The buildings are laid out to deal with the work continuously and in rotation, and consist mainly of receiving and sorting rooms, wash-houses, ironing, and collar dressing rooms. There are also separate buildings, with distinct entrance, for dealing with infected linen.

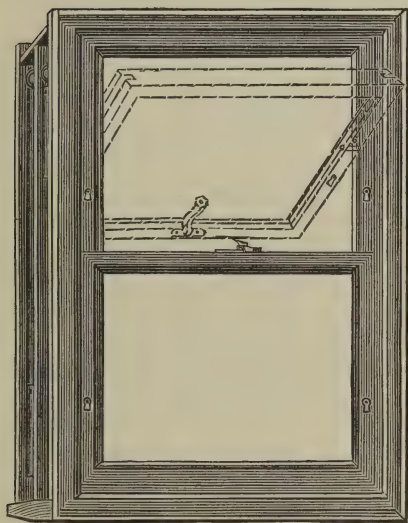
#### NO. 81. FRANCIS E. JONES.

Drawings of Hospital in the *Circular Ward* System of Professor Marshall, and adapted to a confined site such as University College Hospital.

Circular Wards have been adopted for the Hospital at Antwerp now in course of construction.

For information respecting the advantages claimed for Circular Wards, see Professor Marshall's pamphlet, read at Social Science Congress, 1878.

No. 395. ADAMS, ROBERT.



The *Anti-Accident Reversible Window* is here shewn among a collection of other useful appliances for buildings. This kind of window would be serviceable for ventilation in many classes of public and private buildings. The general form and appearance of the window is that of the ordinary sash window, and will act as such, but has the advantage also of swinging on centres to any required angle. Both top and bottom sashes may be revolved, and thus form a louvre ventilator of large size. The further advantage that the sashes may be cleaned with ease and safety, without getting outside in the ordinary way, is to be observed.

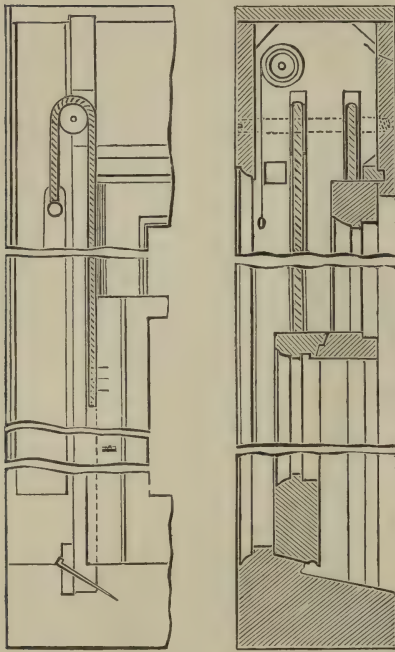
No. 300. ALBISSIMA PAINT COMPANY, LIMITED.

Sanitary paints made from *zinc*. It is claimed that this paint possesses large covering power, it is inodorous, unchanged by gases, and being free from white lead, is a desirable pigment.

No. 89. MONS. BORDIAN (Brussels).

Complete drawings of a theatre at Brussels are shewn, to which M. Bordian has applied a system of ventilation by compressed air. Engines and air compressors are fixed in the basement, from which pipes are carried all over the building, and the air distributed under pressure to any part of the buildings at will. Outlets are provided for the escape of foul air which go into a lantern in the roof of building. In summer means are employed to cool the air, and in winter to warm the air.

## BULLIVANT, TAGLIAFERRO, AND CO.



The arrangement of sash window here exhibited has been somewhat largely used on account of its simplicity and the ease of removing the sashes for cleaning. The exclusion of air and dust more perfectly is a good feature in this invention. The weights, instead of being attached by lines to the sash in the ordinary way, are hung to a moveable guide bar, which travels in a groove partly in the sash and partly in the pulley stile. The guide bar has a spring packing its entire length, which keeps it firmly to the work. A screw passes through the centre of the side of the sash when in work, retaining the guide bar firmly in place. When this screw is removed the weight in falling draws the guide bar out of the sash. The sash can then be lifted out for cleaning.

## No. 361. CHARLES DRAKE AND CO., LIMITED.

The *marble concrete* in various forms was exhibited here, among others may be mentioned a bath of marble concrete, polished inside, and also floors of the same material of various colours.

## No. 83. WILLIAM EASSIE, C.E.

Drawings were exhibited shewing the various arrangements and furnaces used in different countries for the purposes of cremation.

## No. 92. GRANTHAM, JUN., AND BAILEY DENTON, JUN.

This exhibit shews drawings for *abattoirs* and *meat market*, suitable for a large town.

Public *abattoirs* were first established in Paris, and several have been erected in England on similar principles. It is important from a sanitary point of view, that the slaughtering of cattle and the disposal of the offal should be concentrated as much as possible under



public control, and not carried on in private slaughter-houses in crowded neighbourhoods.

The drawings shew the necessary buildings for offices for housing and slaughtering the cattle, for storing, and for the sale of meat. The buildings comprise lairs or cattle sheds, slaughter-houses, and meat market.

The lairs and slaughter-houses are ranged on each side of a gang-way, so that the animals are taken direct from the lairs across to the slaughter-houses.

Tramways may be laid in the streets so as to convey the meat to the market for sale.

#### No. 442. HOWARD AND SONS.

*Patent parquet flooring* in different kinds of wood—oak, walnut, mahogany, &c., made in various patterns. This flooring is laid so as to be impervious to dust and dirt and would no doubt form a valuable floor surface in hospital buildings.

#### No. 328. IHLEE AND HORNE.

*Luminous paints* were here shewn, and a cottage with the interior walls coated with the luminous paint exhibited. Various objects were also shewn for which the luminous paint is suitable.

#### No. 282. MAGUIRE AND CO.

The *Barff* process for coating various iron materials used in building, including corrugated iron sheets, wrought iron pipes, &c., and a variety of other useful purposes.

#### No. 248. G. E. PRITCHETT, F.S.A.

Building construction, shewing various methods of walling and flooring composed of red earthenware hollow pipes laid in Portland cement. It is claimed for these walls and floors that thorough aëration and ventilation are caused, and dampness rendered impossible.

#### No. 289. THE SANITARY PAINT COMPANY

Exhibit various paints, including *Griffiths' white* and silicate paints and petrifying liquids. Griffiths' white is provided as a substitute for the ordinary white lead, and has no poisonous effects, as the lead paints have.

#### No. 287. THE SILICATE PAINT COMPANY.

Paints and colours, and the *Charlton white zinc* preparation to take the place of ordinary lead paints.

## No. 354. SPENCE'S METAL MANUFACTURING COMPANY.

Specimens of *Spence's metal*, for jointing gas and water pipes, fixing iron railings, &c. This material is used in a heated state at a comparatively low temperature, and in that condition can be easily run into any form.

## No. 362. ALFRED WALKER.

Concrete made of slag or granite or breeze, with Portland cement is shewn. For floors and yards, as a finishing coat  $2\frac{1}{2}$  in. thick, this material has been found useful.

## No. 288. FREDERICK WALTON &amp; Co.

"Lincrusta Walton," a new Linoleum product (Linum, flax; Crusta, relief), introduced with a view to improve the appearance of the interior of houses, giving decoration in relief. The idea is to produce the effect of carving by stamping. This material resists the effect of damp and alteration of heat and cold, and can be scrubbed or washed.

## MESSRS. WOOLLAMS &amp; Co.

Wall papers of all colours or tints, and said to be free from arsenic. The bright tints, usually considered necessarily arsenical, are shewn prepared without arsenic.

## SECTION XIV.

## VENTILATING, LIGHTING, AND WARMING.

## No. 410. BENHAM AND SONS.

THE *Ventilating Globe Light* here exhibited may be usefully described in this report.

The object of this contrivance is so to burn gas that the products of combustion should be carried off and not allowed to escape into the apartment, and it is also designed to assist in the ventilation.

The usual form is that of a glass globe, suspended or held from the ceiling by a tube, down the centre of which the gas piping is brought

into the globe and to the burner. At the ceiling the tube is continued for carrying off the products of combustion, and around this tube is an outer tube for removing the heated air of the apartment, and outside this again is the inlet for fresh cold air at the ceiling level. The supply of air to support combustion is drawn from the apartment in over the top of the globe, and as soon as the burner is lighted an upward current is created in the inner tube, and this tube becomes heated and rarefies the air in the outer tube, causing an upward current. The air of both the tubes is conveyed to the flue of the apartment. It is intended, by this contrivance, to produce two distinct actions, viz.: the carrying away of the products of combustion and the drawing off the vitiated and heated air of the apartment at the ceiling level.

The *Gas Fire* of Dr. Siemens is also exhibited. This heating arrangement may be very simply adapted to any existing fire-grate. The heat of the gas flames is transferred to gas coke or anthracite, which, when once heated, maintains a sufficient power for radiation. The gas is applied along the front of the grate, at the bottom bar, and is burnt without the admixture of air, as in the Bunsen burner, as by using unmixed gas yellow flame is set up between the pieces of coke near the front, presenting the appearance of an ordinary coal fire.

#### No. 378. BIRD, PETER HINCKES, F.R.C.S.

The well-known arrangement of inlet for fresh air through the meeting rails of the ordinary window sash. The window sash is lifted up about four inches, and the space below so opened is filled by a strip of wood about four inches deep, and running the whole width of the windows. Fresh air from without is thus free to enter at the space formed at the meeting rails, and has an upward direction towards the ceiling.

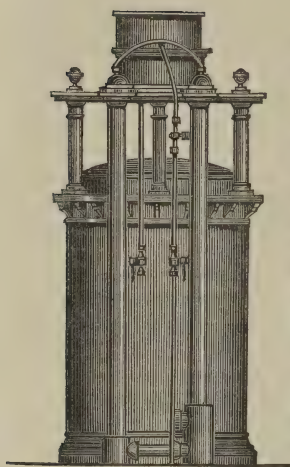
#### No. 268. BOSTEL, DANIEL T.

Exhibits, under this section, a Cowl for exhaust purposes, without any moving parts, and which is contrived to catch the wind in any direction it may be blowing. This cowl is the patent of Dr. Alfred Hall.

#### No. 411. CHORLTON AND DUGDALE.

This exhibit comprises the "Sunlight" Cooking Stove, with the newly-added hot-water supply, which is arranged so as to avoid explosion should the cold water supply cease.

## No. 355. CLARK, F. W.



The *Portable Gas Machine* for making an illuminating gas of rich quality from gasoline.

The machine is self-contained, and requires merely to be placed in position, and it is automatic in action. The general appearance of the machine is that of a small gas holder. The small retort of cast iron is placed above the holder portion, and is heated by gas made in the machine itself. The gas is of rich illuminating power, and does not give off in burning any sulphur or ammoniacal impurities. The gasoline, which is kept apart from the machine, is allowed to flow into the retort as required, where it is subjected to a destructive distillation, mixes with warm air, and forms a chemical combination and a permanent gas of uniform quality.

## No. 270. CLIFF, JOSEPH AND SONS.

The *Anglo-German Stove* here exhibited is formed in the same way as other well-known stoves of this class, with glazed ware of artistic design and colour.

The details of this stove vary slightly from some others in the exhibition. The fire door and damper are arranged on the narrow side of the stove, and are of German manufacture. There are tubes for the inlet of fresh air to the stove, and for the carrying off the products of combustion.

The stove may be fed with anthracite coal, and, it is said, will burn 24 hours without attention.

## No. 391. COMYNS, CHING, AND CO.

The *Boyle Outlet Ventilator*, having mica flap valves, for fixing into chimney flues, and utilising the upward current therein for ventilating rooms of dwellings.

## No. 374. CONSTANTINE, JOSEPH.

The *Convolutud Stove*, for warming public buildings, as shown, consists of a number of castings bolted together and forming deep



square corrugations, the inner surface forming conductors of heat and flame, and the external flues warm air channels, inducing rapid circulation and diffusion. Slabs of fire-clay rest near the upper part, and equalise the heat in all parts of the stove. The sides and back are provided with fire-brick lining, protecting the metal from immediate contact with the fire.

No. 366. CONSTANTINE, T. J.

This exhibit comprises Cooking Ranges in a number of sizes, from the artizan's or cottager's, to those with double ovens and boiler, capable of cooking for 50 persons. The stove is a self-contained apparatus, and can be placed either in the ordinary opening of the kitchen fire-place, or anywhere most convenient, and requires no setting.

The stove is supported on four short legs, lifting it from the floor about 4 inches; the advantage of this being that dust and dirt can be readily removed.

The heat from the fire-box is utilised to the utmost, and chambers are formed around three sides of it, and the central fire bar is also hollow for warming air.

The door of the fire-box is specially constructed, so as to admit fresh air, and deliver the same warmed over the fuel, thereby assisting in obtaining complete combustion.

The chamber around the ovens has a series of gills, over which the heat has to pass, and the bottom has a loose plate, under which there is also a row of gills. The ovens are ventilated by an inlet and outlet.

The idea of retaining heat over the surfaces as long as possible pervades the whole construction.

Anthracite may be burned in these stoves with advantage.

No. 357. CROSSLEY BROS.

The "Otto" Silent Gas Engine, which is the exhibit under this number, is now so well known and so largely used that it requires no explanation here.

No. 307. DYER, FREDERICK.

The System of Hot-Water Circulation here shown is well known, and has been largely applied in this country. The main feature of the system, which was introduced from America, is the cylinder placed in any convenient position contiguous to the fire heating the

boiler. The usual and most advantageous way of heating this boiler in private houses is by the kitchen fire. The boiler is of small size, and made tubular, and can be fixed to either an open or close range.

The supply from the cold water cistern is laid on direct to the cylinder and boiler. The boiler is in connection with the cylinder, and has the ordinary flow and return pipes.

The hot water is caused to circulate from the top of cylinder and from the boiler throughout the house and back again to the boiler.

The cylinder can be made of any size, from 50 gallons upwards, and takes the place of the dangerous hot-water cistern, usually placed in the upper part of the house.

A safety valve is placed on the top of the cylinder, and weighted according to the head of water to be resisted: there is also the usual expansion pipe, placed at the highest part of the apparatus. It is impossible by this system to draw off the water below a certain fixed level, and the kitchen fire can thus be kept up in full action without fear of explosion in frosty weather.

No. 278. ELLISON, JAMES E.

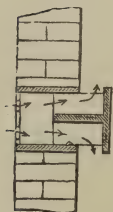
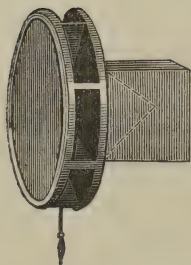


FIG. 1.



FIG. 2.

The exhibit is entirely one of Ventilation Appliances, and shows the conical perforations for bringing in fresh air without draught. The perforations are shown for bricks of various dimensions, and also for skirting boards.

The *Air Diffuser*, which is a simple appliance also for introducing fresh air without draught, consists of a square or circular plaque, with four cross divisions at the back, and is fixed into an aperture in the vertical wall. The amount of air admitted can be regulated by the distance that the plaque is drawn out, and it can never be entirely closed, as the four stops at the back prevent it being pushed fairly against the wall. The plaque may be made ornamental by inserting china painting, painted panel, or looking glass in the front.

Fig. 1 is a section of the "air diffuser," and fig. 2 a view of the back: the dotted lines show the position of the divisions.

No. 418. FARWIG, J. F.

Exhibits various forms of the George Calorigen for heating by gas, coal, and other fuel.

## No. 377. FARADAY AND SON.

The exhibit shows the arrangement made by this firm for carrying off the products of combustion from gas lights. The chief feature is that of a bell glass placed over the burners, and attached to an outlet pipe taken to the outer air.

The outlet pipe is coated with asbestos and an outer zinc pipe.

## No. 415. GIBBS, ROBERT RENTON.

*Air Cleansing Prisms* shown, forms an apparatus for cooling, cleansing, and purifying air, as it is admitted; it is formed by a series of glass V-shaped troughs, and water is laid on and made to flow from the top trough downwards through the series.

The air from the outside has to pass through the falling water and over the water contained in the troughs, by which process it is cooled and purified.

The Hot-Water Grate shown is formed by fixing a coil of iron pipe at the back of the ordinary fire-grate, and forming also the front grate bars. A hot-water circulation is thus formed, and would be available for various purposes, such as warming a bedroom from sitting-room fire.

## No. 375. GRIFFIN, ROBERT H.

The arrangement of the *Ventilating, Heating, and Smoke-Consuming Stove* consists in the formation of a space at the back of the grate, where fresh air from the outside is admitted. A covering plate is placed horizontally over at the highest part of the grate, and has the flue tube cast on it.

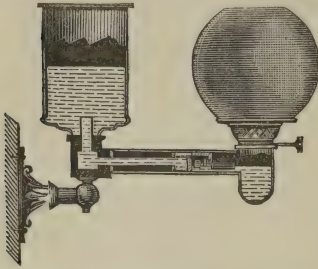
Air from without is warmed by contact with the grate, and passes upward and outward into the room at a level just above the grate. Air from the room feeds the grate from its perforated back, and the smoke passes up the tube mentioned.

## No. 367. HELLIER, WILLIAM.

This exhibit belongs to a class of apparatus called *Instantaneous Water Heaters*. In this case the supply of water is automatic, being regulated by an ordinary ball valve. A large heating surface is provided by an arrangement of two tapered chambers and three independent coils in the centre of the inner chamber. The gas burner used is the atmospheric type, arranged on cross bars, and the products of combustion are allowed to escape into the apartment. No flue being provided.

## No. 241. HOPKINSON, W. W.

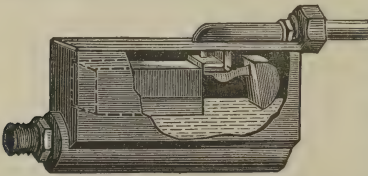
The "Libra" Lamp, with an independent reservoir for the oil, which allows of fresh supply to be filled in whilst the lamp is burning.



The lamps exhibited have a reservoir containing 18 hours' supply, and the oil filters from the vase, and passes along the tube and through the "Libra valve," which regulates the admission to the burner, passing just so much as the lamp is consuming. In this arrangement of lamp the oil is always maintained at a fixed level not being burnt down lower, as in lamps of the usual construction, and thus the wick does not become charred to the same extent, and requires less attention to trimming.

The large shadow which is cast by the oil vase of ordinary lamps, is obviated in this form of lamp.

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The "Libra Valve" is also adapted, in a larger size, for regulating the supply of water to kitchen boilers, and from its small dimensions,  $6\frac{1}{4}$  inches  $\times$   $2\frac{3}{4}$  inches  $\times$   $4\frac{1}{2}$  inches, would be very convenient, taking the place of the

cistern and ball valve at present in use.

## No. 376. S. LEONI AND CO

This exhibit comprises the well known Gas Cooking Stoves and the "Heating and Ventilating Calorifere." The calorifere is an arrangement of a gas stove under a china-ware cover, and has a flue-pipe conducted into a chamber, where it warms fresh air brought in from the outside. The fresh air comes into the room somewhat on the Tobin principle, but is heated on its way in the chamber mentioned. The outlet-flue runs in the centre of the inlet-tube, and thus all the heat would be utilized.

## No. 412. MUSGRAVE AND CO.

The *Slow Combustion Stove* in all its varieties is shown. Fresh air is introduced and made to circulate around an outer casing, and eventually to escape into the room warmed.

The fire-box, lined with fire clay, contains sufficient fuel to last from 8 to 24 hours, according to size of stove. It is fed through the top, and air is admitted for combustion by sliding door near the bottom.



The new Smokeless Stove Grate, called the *Ulster*, is also exhibited. The *Ulster* is nearly like the ordinary register stove grate in appearance, but has a chamber for holding supply of coal which replenishes the fire as it burns away. When the grate is in operation the new fuel becomes heated, and the products are made to pass through the burning fuel and are thus consumed, adding to the brilliancy of the fire.

No. 315. PICKARD, JOHN REYNARD.

Domestic Fire Grate consuming smoke and preventing down draft.

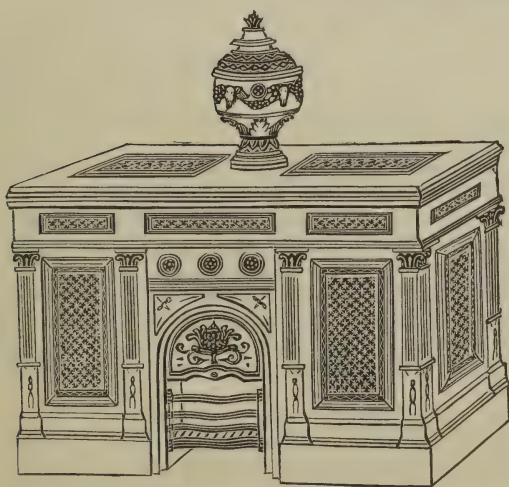
The general appearance of this grate is like the ordinary register grate, it differs essentially however in detail. The fire back is provided with openings, and under the grate an opening is made for the admission of air from the apartment. The arrangement is applicable to all existing fire places.

The smoke passes through the fire instead of over it and into a combustion chamber, where its ignition intensifies the heat. A damper is arranged in the back for regulating the draught.

No. 421. PORTWAY, CHARLES.

The *Tortoise* Slow Combustion Stove has a fire clay chamber, and is fed at top, and will burn for 7 to 10 hours, according to size of chamber. The draught is regulated by door at the bottom.

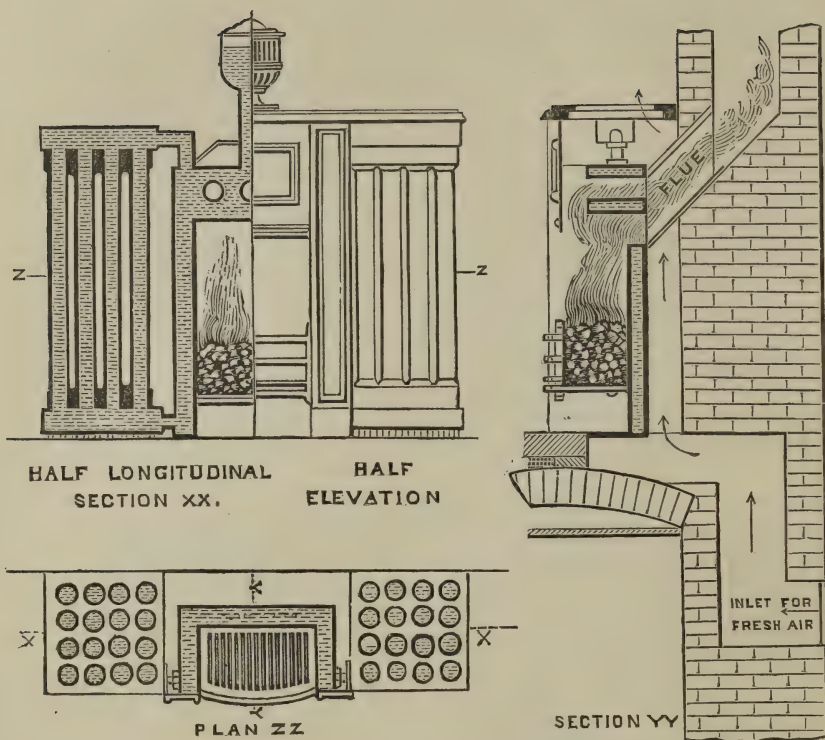
No. 420. POTTER, THOMAS AND SONS.



The *Thermhy-dric* Ventilating Hot-Water Open Fire Grate, the patent of Mr. Saxon Snell, F.R.I.B.A. The illustration will at once give the general outward appearance of the stove, and the construction will be seen in the sections. An ordinary fire grate is surrounded by a compartment filled with water, which is connected by tubes to a battery

of coils on either side of the stove.

From this arrangement the advantages of the open fire are obtained, and in addition all or nearly all the heat is utilized in raising the temperature of the water and circulating it: this heat is given off by



the coils. Fresh air is admitted around the back of the stove, and becomes warm before delivery into the room.

The stove may be somewhat differently arranged for the centre of wards, and, in this case, descending flues would be employed.

The revolving smoke-consuming fire grate exhibited is an arrangement by which the grate or fire basket is made to turn on pivots. The basket is closed by bars top and bottom, and can be opened for putting in fresh fuel. When fuel is added to the fire the basket is turned over, bringing the lower part uppermost, the added fuel being now below, where it becomes warmed and partly distilled; the fire goes on burning, giving off little or no smoke.

No. 248. PRITCHETT, G. E., F.S.A., F.R.I.B.A.

New patented system of Heating by Hot-Water, and also for the passage and changing of air without draught or loss of temperature. This invention is shown by a full sized section of one side of a room or hospital ward. The heating surface in this system is obtained by corrugated sheets being fixed together, leaving a small space of about  $\frac{1}{8}$ th inch between them for the circulation of hot water. A heating

surface, say of 20 superficial feet, is obtained with as little water as would be required for one foot of a four inch pipe. The fuel required would be reduced correspondingly, and the flow and return pipes on this system would be much reduced in size.

The corrugated heating plates project  $1\frac{1}{2}$  inches from the wall, and they may be kept open to view and decorated, or may be boxed in with panelling.

The external air is admitted at about the floor level, and passing upwards, becomes warmed against the face of the corrugated plates, and passes into the room through louvre openings at about 6 or 7 feet from the floor.

The louvres are made with Ree's patent metallic plates, enamelled to correspond with the style of decoration, and will bear the heat from a Bunsen burner being passed over them so as to destroy germs of infection when the system is used in fever wards.

The vitiated air is drawn out of the apartment by arranging corrugated heating plates near the ceiling or cornice, and can be led away into flues.

It is claimed that by this system the warming of an apartment would be equable, unlike warming from open fires by radiation.

The portable heating apparatus is made on a similar principle by corrugated plates, with the film of water circulating between; and one form is that of a pillar about one foot diameter and three feet high. The heating may be by gas or oil lamp, and the products of combustion are not led away into a flue, but an enlarged chamber is formed at the outlet, and the products are said to condense and form a fluid. There is also provided, at the end of the outlet, a bag dipping into a solution of chloride of calcium, and the products of combustion have to filter through the pores of the bag charged with the solution.

#### No. 353. PRIESTLEY, MRS.

The Floral Art Ventilator, designed by Mrs. Priestley, is simple and artistic, and would form an effective means of introducing fresh air without draught, except, perhaps, during cold weather.

The arrangement consists essentially of an outer window and an inner window, with a space between in which flowers may be grown. The bottom part of the outer window, and the top part of the inner window open, and can be regulated at will. The air by this arrangement has to pass over the growing plants, and travels upwards and enters the room by the top opening.

#### No. 382. RITCHIE AND CO.

The several varieties of the *Lax-Calor* Hygienic Condensing, Heating, Lighting, and Ventilating Stove are shown. The stove is usually heated by gas, but where this is not to be had, mineral oils may be used instead.

The usual form of this apparatus, which is about 3 feet 6 inches high, is that having a gas burner with a glass chimney placed midway between two side pillars. The heat and products are conveyed

by this glass chimney over the top, and travel down the side pillars into a box or receiver below. This receiver, being the coolest part of the apparatus, condenses the products of combustion, and the liquid is caught in a tray below.

There is no flue to this apparatus, nor any fresh-air inlet.

#### No. 380. SILBER LIGHT COMPANY.

General exhibit of the *Silber* patented lamp burners for colza and mineral oil, cooking and heating stoves, the heat being derived from two 4-inch flat burners, consuming mineral oil.

#### No. 346. STEEL AND GARLAND.

The *Wharnccliffe Grate* here shown, differs from the ordinary grate in that the fire-box, which is usually placed in a recess and far back from the flame of the grate front, is in this grate brought prominently forward into the room, and the sides are splayed off. By this arrangement a large area of heating surface is utilized and much heat saved, which usually goes up the chimney.

The grate is self-contained and requires little fixing. The ornamental canopy forms a hot air chamber, the cold air being admitted by a pipe about 4 inches in diameter, passes up the sides and back through a series of gills, and, having become heated in its passage, proceeds through a perforation at the top of the canopy distributing warm air into the apartment.

The *Noiseless Coal-box* for Sick Rooms is a simple contrivance, six small scoops containing the charges of coal are fitted into a box, so as to slide in and out.

#### No. 286. THE SANITARY ENGINEERING AND VENTILATION COMPANY,

Exhibit the "Imperial" Vertical Tube for bringing in fresh air to a room, at about 4 feet 6 inches from the floor. The tubes are provided with arrangements for filtering the air before entering the apartment, a very necessary arrangement in large towns.

#### No. 327. SHARP AND COMPANY.

The *Crown Ejector Cowl* is the chief feature of this exhibit, and its application is shown for ventilating large buildings.

#### No. 383. STEVENS, CHARLES RICHARD.

Exhibits models of inlets and outlets for ventilation, and having a frame wound with wool to act as a strainer to the incoming air.

A new apparatus for heating by an admixture of steam and hot air, is also shown.

The apparatus consists of a copper boiler, supplied with a small quantity of water from a hydrostatic fountain, or ball valve if more convenient. The boiler is heated by gas or lamp, or other means. The water within the boiler is converted into steam and passes, together



with the heat from the fuel, through pipe coils arranged in some convenient form for heating purposes, and eventually terminating in a small pipe which carries off the products of combustion.

The Circulating Water Heater is an apparatus for supplying hot water to baths, lavatories, and for general domestic purposes. The apparatus consists of a galvanized tank, supported upon a light frame of iron, and in the centre is placed the tube enclosing the boiler gas-burner.

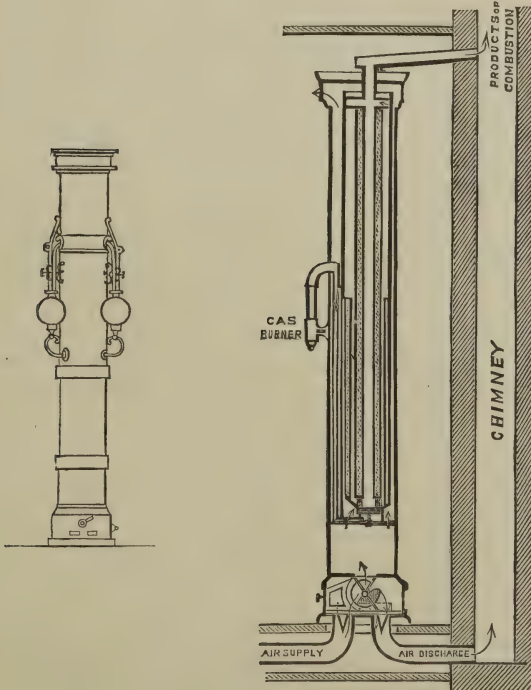
The tank is fitted with a cold water supply, and an outlet for hot water supply to any part of house desired. The gas is burnt on the atmospheric principle.

There is an escape pipe for all products of combustion.

#### No. 426. STRODE AND CO.

The *Schönheyder* patent Sanitary Stove for lighting, heating, and ventilating. The source from which the heat is obtained in this stove is from one or two, or more, argand gas burners, which give light, and are then utilized for heating purposes.

The outward form of this stove is that of a pillar, which can be made ornamental if thought desirable. The gas burners are arranged at any convenient height for lighting the apartment, and from



the glass chimney an iron elbow conveys the heated products of combustion downwards into a chamber, from whence they pass up into the cylinder, which acts as the heater, and thence away into the flue. To prevent the unpleasant effect of burning the air by over heating (as in some close stoves) the downward pipe from the gas-burner is surrounded by slag wool or other good non-conducting material. The fresh air supply is taken in by a separate pipe at the base of the column and ascends through an annular space, where it gradually becomes warmed and is delivered into the room at the top of the stove. Air is drawn from the room at the base through openings and delivers into the flue, thus causing a constant circulation. If it is desired to warm the room without ventilating, a door with a slide hit-and-miss valve at the base is opened, and this shuts up all inlet for fresh air and the outlet from room. In summer all products of combustion are made to pass away into the flue by a direct communication.

#### No. 280. THE THAMES BANK IRON COMPANY.

Among a large miscellaneous exhibit, the most noticeable feature is the improved *Gill Stove* made up in sections, and to take to pieces.

#### No. 242. TONKS, WILLIAM, AND SONS.

*Curral's* Outlet and Inlet Ventilators, made in bronze metal. The inlet ventilators are made to fix on the bottom rail of window-sashes, and on the middle rail of doors, and are in lengths of 18 inches and 24 inches, they can be arranged to admit any quantity of air by fixing a sufficient number, for large window-sashes two, or perhaps three may be necessary.

The air is admitted through perforations on the outside, and enters a long narrow opening furnished with a deflecting plate, the quantity being controlled by a regulator bar. The regulator bar in some forms of the apparatus is loose, but in others it makes a fixed valve.

A modification of the Ventilator, arranged by Mr. Mark Judge, is shown for admitting air into a room over the architrave moulding at the top of the door or windows, and is described as acting either as an inlet or outlet ventilator, according to the condition of the air in a room.

#### No. 416. VERITY, BROS.

The patent Ventilator or *Air Propeller*, is a contrivance for bringing in a current of fresh air by means of a revolving fan, driven by pin-hole jets of water from an upper cistern. The current is admitted generally at a height of 5 feet 6 inches from the floor, and can be regulated in quantity and direction.

Means for filtering incoming air, and in hot weather, for cooling the air, are provided.

The Patent Gas Fires made by this firm, are also shown, as well as the Patent Bath Boiler, and the Osborn Combined Boiler and Coil.

## SECTION XV.

WATER CLOSETS, SINKS, BATHS, &c., SEWAGE  
AND DRAINAGE.

## No. 304. ANGELL, A. T.

Air-tight Covers for manholes and inspection shafts on house drainage systems. The covers exhibited were of cast iron, and consisted of a frame and door, with locking apparatus and key to open. An indiarubber ring makes the joint between the frame and door air-tight, and the outer surface is chequered to give foothold.

## No. 254. BEARD, DENT, AND HELLYER.

General exhibit of sanitary apparatus, including water closet apparatus, flushing cisterns, disconnecting traps, and gullies for waste and rain-water. Various examples of plumbing were also shown, and the cast lead S and P traps.

The *Artizan Water Closet* commends itself for the arrangement of improved joint and flushing-rim, and one of these, fitted with an earthenware top under the seat (which lifts), to form a slop sink, was shown. The valve closet, fitted with large overflow and ventilation to valve-box is here exhibited. The disconnecting trap for soil pipes made in stoneware, with an enlarged inlet grating for fresh air, and the disconnecting gullies, with side inlets for rain-water and sink waste, require notice here.

## No. 271. THE BIRMINGHAM SANITARY ASSOCIATION.

Exhibit the *Edinboro' Air Chambered Trap* (Pott's Patent) in various sizes. This useful contrivance is made in one piece of stoneware, glazed, and consists of an open channel, with sharp fall leading into a syphon trap. There are inlet sockets arranged at the back and sides for taking soil pipes, and sink and rain-water pipes. The open channel is covered by an open iron-work grating, and special pieces of earthenware are made to bring this channel up to surface level when the trap itself is deep below the ground.

## No. 247. BOLDING, JOHN, AND SONS.

The *Simplex valve closet*, with flushing rim and water supply to overflow.

The "National" wash-out closet, with flushing rim made in one piece of earthenware.

The "Champion" trap, made of lead piping and turned into a spiral form, may be considered ingenious, as giving a continuous flow.

## No. 268. BOSTEL, DANIEL, T.

The exhibit in this section consisted mainly of the *Brighton Excelsior* valveless water-closet. This apparatus is made in one piece of earthenware, and is of the "wash-out" type, it consists of a basin with trap beneath, and vertical opening at the side to inspect the trap. The form of the basin admits of water remaining in it about one and a half inches deep, and the flushing rim is arranged so that the water impinges in such a manner as to entirely clear away the contents of the basin at each flush.

## No. 347. BRAITHWAITE AND CO.

The patent syphon water-waste preventer is a simple arrangement for flushing water closets, and it consists of an ordinary syphon with an enlarged leg in the cistern, the other and longer leg being outside. A piston, working loosely in the enlarged leg, is set in motion by pulling a lever in the ordinary way, and causes a sudden flow over the top bend of the syphon, which sets it in action and empties the whole cistern at once. The exhibit under this section also includes the wash-out closet with flushing rim and Claughton's lead traps. This trap has the appearance of an oval bulb outwardly on the lead pipe, and would be convenient in many cases.

## No. 259. BROOKE, EDWARD, AND SONS.

General exhibit of stoneware manufacture, including pipes, gullies, invert blocks, &c.

The patent *ribbed pipes* of earthenware, exhibited for the first time. This invention consists of adding to the ordinary pipes, ribs made with the pipe, and serving to strengthen them from crushing. The weight of pipe is greatly increased, and the jointing made somewhat more difficult.

## No. 261. BUCHAN, W. P.

The drain trap, with cascade action for disconnecting soil pipes and wastes generally, consists of a syphon trap with a back inlet arranged to deliver about 2 inches above level of trapping water (hence the cascade action). The trap has an inlet at top, furnished with grating to admit fresh air.

The drain pipes, with rest formed at the sockets, and long oval inspection covers are shown.

The *Carmichael* wash-down accessible closet consists of a basin with its outlet so curved as to form a syphon-trap, the deepest part of which can be seen from the basin; the whole apparatus is in one piece of glazed earthenware. There is an inspection cap, which gives access immediately to the soil pipe, which can be cleaned from this opening. The flushing water cascade and the flushing round the sides of basin, are designed to clear the trap each time of using the closet, and to keep the basin clean. A two-inch valve and supply pipe, with large flush of water, is required for this form of closet.



## No. 332. CAPPER, SON AND CO.

*Pearson's* patent Trapless "Twin Basin" water closet, made in one piece of white glazed earthenware, is arranged with a basin and compartment at the side containing a ball-valve for admitting water. The plug has an india-rubber flange, which makes a water-tight valve. When the plug is raised the water previously contained in the basin, together with excreta, goes away to the soil pipe direct, no trap intervening, and the ball-valve allows a fresh supply to fill the basin again.

The *Brian Jones* joint is a special form for connecting the basin apparatus with the soil pipe, with a view to prevent escape of sewer gas, or the joint perishing, or being broken.

## No. 270. CLIFF, JOSEPH, AND SONS.

A large general exhibit, among which may be noticed the enamelled stoneware sinks and baths.

## No. 253. DOULTON AND CO.

The *Stanford* patent joint for drain pipes, now so well known, is exhibited. It consists in forming around the spigot end and inside the socket a ring of Asphaltic material, moulded to a true surface and forming, when put together, a slightly ball-and-socket joint. This arrangement of joint entirely does away with any jointing material, such as cement and the usual gasket.

The "Kenon" air chamber, floor and trap, is designed in order to simplify the construction of disconnecting manholes for house drainage. The trap is made in one piece, and the floor or open channel part in another piece of stoneware. The floor has an ordinary socket cast at one end to take the spigot end of trap. The "Kenon" floor forms the bottom of the manhole which is usually made with open channels turned in cement or separate earthenware channels. The brickwork is built around the Kenon floor and brought up to the required part. Doulton's joint for drain pipes consists in having the butt ends of the pipes ground so as fairly to fit against each other. A flange or collar is cast on the pipes about  $\frac{3}{4}$ -inch from each end. The pipes on being butted against each other leave a space, say  $1\frac{1}{2}$ -inch and  $\frac{1}{2}$ -inch deep between the collars, this space is filled up with Portland Cement. The pipes rest on stoneware cradles.

## No. 351. DURHAM, C. W., OF CHICAGO.

The construction of house drains, especially soil pipes with wrought iron tubes and screw joints as in gas or steam work. This construction renders soil pipes and drains rigid and self-supporting, and settlements of buildings would not be liable to cause failure as in lead and stoneware pipes.

## No. 331. EMANUEL, A., AND SONS.

Exhibit syphon action water waste preventer with an after flush. This apparatus consists of a cistern divided into two compartments by a partition. A ball cock supplies water to the right hand compartment, the ball of which floats in the left hand compartment. In the under part of the partition is a small aperture, and when the water rises in the right hand compartment it overflows through the aperture into the left hand compartment until the rising of the ball cock shuts off the supply. A syphon  $1\frac{1}{2}$  diameter opens into the right hand compartment and has the longer limb going to the supply of water closet basin. A smaller syphon opens into the left hand compartment, and the longer limb goes into the larger syphon and gives the after flush. A flat plate fits loosely into the right hand compartment like a piston, and is attached to a lever actuated by a chain in the usual manner. The action is this, that when the cistern is full pulling the chain acts on the plate or piston and pulls water over the larger syphon which is at once set into action and gives the required flush from right hand compartment into the closet basin, the smaller syphon now comes into action and delivers the contents of left hand compartment giving the after flush.

## No. 381. GILLOW AND Co.

The lavatory made for limited space consists of a case made of any suitable wood, standing about 10 or 12 inches from the wall.

The lavatory basin and receptacle for holding waste is within this case. The act of shutting the door turns the basin parallel to the door and thus occupies the least space.

## No. 329. HAYWARD, TYLER, AND Co.

Exhibit a new hopper closet of good design with flushing rim and trap. *Chandler's* waste preventing cistern (giving the two gallon flush) for using in connection with this apparatus is also shown. The basin trap and flushing cistern are always sent out together and form one complete apparatus.

## No. 306. HOWARD, EDWARD.

Here we have the arrangement designed by Mr. H. Saxon Snell for automatically flushing and ventilating water-closets.

The arrangement consists of a special shut-down flap, being fitted at a slight angle, and working on centres situate about 9 inches from back of flap.

When the closet is not in use the flap is always down, and communication with the outer air or flue, built especially at back, gives the ventilation. The action of the flap shutting itself after using the closet causes water flush.

## No. 266. INGHAM, W., AND SONS.

The *Stanford* patent joint is here exhibited, and was described under Doulton and Co.

*Brown's* patent accessible Disconnecting trap is a useful arrangement for disconnecting soil pipes and wastes generally. It has an access cover on the sewer side of trap. The inlet is set up at an angle which would be convenient in some cases.

The balanced "flap valves" shown have an adjusting ball to screw backwards and forwards so as to adjust the flap exactly right after fixing.

## No. 257. JENNINGS, GEORGE.

Among the interesting exhibits of this firm, the most noticeable in point of novelty is the "Flushing Jar," arranged to automatically flush urinals, etc., at regular and stated intervals. It consists of a glass cylinder or jar holding about one gallon supplied continuously with a small run of water regulated by an ordinary stop-cock according to the time at which the flushing is required. A spiral syphon, like a horizontal "Archimedeian" screw, is fixed in the glass cylinder, and terminates at one end in the supply pipe for flushing the urinal, the other end, slightly bell-mouthed, opens into the jar or cylinder.

When the water has gradually filled the jar or cylinder to a certain height, the spiral syphon comes into action automatically and empties the contents into the basin of urinal, causing it to be properly flushed.

The "Dubois" drawn lead traps of various shapes and sizes are exhibited.

The lavatories fitted up with the shampooing apparatus. The apparatus is made entirely in metal, with universal joints enabling it to be turned into any position in the same manner as in india-rubber tube.

The lead traps provided with india-rubber bulbs, which fall in their seating and close the passage against sewer air, even should the water become evaporated from the trap, are worth notice.

## No. 344. JOURNEYMEN PLUMBERS' EXHIBIT.

These exhibits were sent in competition for prizes offered by the National Health Society. (See Mr. George Shaw's report).

## No. 282. MAGUIRE AND Co.

The *patent safety joint drain* is made with stoneware pipes of ordinary form with the addition at each joint of a rest or cradle, also of stoneware made hollow to receive the sockets. The joint is made in the usual manner, and afterwards the cradle is filled up with liquid cement. The cradle comes up the pipe about half-way; the top part of joint being easily made. The advantage of the cradle is that it enables the pipes to be laid concentric.

The *patent self-acting flushing tank* is an apparatus for automatically flushing drains and sewers at regular intervals.

The apparatus consists of a tank divided into two compartments by a vertical plate having a small pipe near the top. A lever has its fulcrum on the division plate, and one end actuates a valve at the outlet of larger compartment connecting with drain to be flushed. The other and shorter end of the lever carries a small cylindrical cistern. The action is, that as soon as the larger compartment fills with water up to the level of the small pipe in vertical plate, it overflows by this pipe and fills the cylindrical cistern, and when the weight of water in this cistern becomes sufficient, it lifts the larger end of the lever and opens the valve, allowing the water in the larger compartment to escape suddenly into the drain and so flushing it. There is a small hole in the cylindrical cistern which allows the water in it to empty away, which causes the valve to shut again ready for the next filling of compartment.

*Dr. Scott's* hospital disinfecting apparatus made for using either gas or coal as means of heating.

The chamber is made with walls and door of an improved composite non-conducting material. There is also an improved safety valve to prevent heat exceeding 300° Fahr. The apparatus is furnished with an inlet valve and ventilating shaft with outlet valve.

#### No. 317. MOULE'S PATENT EARTH CLOSET COMPANY.

The Moule earth closet, now so well known and largely used, is here exhibited in various forms. The No. 9 Pattern having pull-up arrangement for passing and spreading a quantity of earth each time closet is used, is a convenient form.

#### No. 313. PARKER, JOHN.

The dry earth closets, self-acting, works with earth or ashes, and has a pull-up handle and pail receptacle. In some forms of this apparatus there is a trough under the seat for separating liquid. This would necessitate the laying of a drain to convey the liquid away.

#### No. 342. PURNELL, J., AND SON.

The *Purnell patent syphon water waste preventer* is a simple contrivance for giving the two gallon flush and no more. The apparatus consists of a cast-iron cistern containing two gallons, within which is placed an ordinary syphon, the short limb opening into cistern and longer limb into the supply pipe for flushing water-closet basin. A valve of the spindle type is arranged to be actuated by a lever and chain with handle in the usual manner, and the valve connects with a short branch piece with the longer limb of syphon. When the chain is pulled down it opens the spindle valve and allows water to flow down the longer limb and sets the syphon in action, which continues until the whole contents of the cistern has been delivered into the closet basin.

The white glazed stoneware channels exhibited are of various forms suitable for forming inverts in manholes, and would be found useful in many cases instead of the usual cement channels.



The *Hopper Closet*, with flushing rim, is a simple form of closet and with a good flush, such as from the syphon water waste preventer would form a clean, efficient, and cheap closet apparatus.

No. 340. SCOTT, B. AND READ.

This exhibit comprises various adaptations of *Field's patent annular syphons* for flushing tanks.

The principle is suitable for the automatic flushing of town sewers, house drains, water-closets and urinals, or for trough closets. The distinguishing feature is that it has no working parts, and a very small dribble of water will start the syphon into action.

The syphon consists of an inner tube forming the longer limb, and an outer tube closed at the top forming the shorter limb. Into a tank of the proper size, the longer limb is fixed in a vertical position, the lower end projecting through the bottom and dipping into water which is kept at a proper level by a weir.

The action is as follows :—When the water or sewage has gradually risen in the tank to the level of the top of the longer limb, instead of running down the sides of the pipe, it is caused to descend over a lip, and by this means a quantity of air is displaced which forms a partial vacuum and thereby starts the syphon, which then empties the tank with rapidity.

For flushing house drains the galvanized iron tanks are suitable. They are self-contained, and afford an economical means of flushing periodically and preventing dangerous deposits. For flushing sewers large annular syphons are built into a tank of suitable dimensions.

No. 281. SHANKS AND CO.

This exhibit comprises bath and lavatory apparatus, and water-closet and sink apparatus.

The "Wash out" closet is arranged with outlet at the front which is not visible. There is a flushing rim, and it is designed to leave a small quantity of water in the basin each time about  $\frac{3}{4}$ -inch deep. The flush comes from the back and from the rim all round. The combined effect is to clear out the basin and trap of any deposit at each flush.

The valve closet is of good pattern and well made, and has the valve box ventilating.

No. 327. SHARP, C. H., AND CO.

The water-closet designed for *ship's use* above the water line is of the valve type, and has a double action to prevent heavy seas from washing back into the apparatus.

No. 341. SHARP, HENRY, JONES AND CO.

The glazed stoneware pipes, with the Stanford patent joints, here exhibited, were described above under Doulton and Co., No. 253. The joint composition is described as being of tar, sand, and sulphur.

The *Rock concrete* tubes exhibited composed of Portland cement, made of true form with smooth surface. The experience gained with this kind of construction for sewers goes to show that as at present manufactured they require caution in using.

No. 284. THE SHONE DRAINAGE SEWERAGE AND WATER  
SUPPLY COMPANY LIMITED.

This Exhibit consists of the *pneumatic ejector*.

The *Hydraulic Ejector* for home drainage.

The *Hydraulic Ejector* for town sewers.

The Pneumatic Sewage Ejector was tried on the Havod-y-Wern Farm at Wrexham on an experimental length of sewer and worked during some months. The model exhibited is on the same principle and consists of an ejector worked by compressed air. The ejector can be fixed in any manhole on a town sewerage system, and the compressed air may be sent along cast-iron mains from a central station. When the sewage has gravitated into the manhole and filled it to a certain height, the ejector comes into operation automatically and drives the sewage away into a sewer at a higher level which gravitates to the outfall into the sea or on to the land. The value of such a system would be best seen where the available fall for sewers was very limited.

The Hydraulic Ejector for house drainage here exhibited, full size, consists mainly of a stoneware flush tank fitted with a syphon piece also of stoneware, the longer limb going into the drain which passes to the sewer. A tumbler box, working on centres, and holding about  $1\frac{1}{2}$  gallons, discharges into a funnel-shaped pipe passing through the top and ending near the bottom of the tank. A soil pipe and wastes of any kind enter at the top and discharge into the tank. The tank having become full, the tumbler-box suddenly discharges the  $1\frac{1}{2}$  gallons through the funnel-pipe and sets the syphon in action which clears the tank entirely of its contents. The tumbler-box may receive its supply from a waste, from sink or bath, and is stated to act as a grease trap in the case of sinks. There is a ventilating shaft from the tank carried up to a convenient height.

No. 255. STIFF, JAMES, AND SONS.

Among a large exhibit of general stoneware, we may mention the *Weaver* soil pipe disconnecting trap. It consists of a stoneware syphon bend having a back inlet with a drop of about 2 inches to the trapping water, and has an open top covered with a grid of stoneware for admitting fresh air. There is also provided a socket for ventilation pipe on sewer side of trap.

The "Weatherly" disconnecting and ventilating sewer air trap is a double syphon trap. There is a square chamber between the two syphons, on the top of which there is an opening for a ventilating

pipe and a lid for inspection. The inlet for the wastes into first or upper trap is placed at an angle upwards, and there is also a small grating for admission of fresh air.

No. 256. TYLOR, J., AND SONS.

This exhibit shows an extensive range of sanitary apparatus, including valve closets, urinals, lavatories, water waste preventers, waste not valves, sinks for various purposes, baths and bath fittings. The valve closet, with flushing rim, has no overflow to basin connected with the valve box. The Basin is intended to overflow into the safe below. The valve closet is also fitted with moveable valve seating, enabling a new valve to be put in without taking down the basin in the usual way.

The "Waste not" cistern valve automatically closes after allowing the intended quantity of water to pass. The urinal, with lip trap, so as to facilitate inspection, is also self-flushing, the form of trap giving a syphoning action at intervals.

No. 326. UNDERHAY, F. G.

The *patent regulator* of Underhay is to allow the passage of a certain quantity of water through the basin of the closet each time the handle is raised even should it be dropped again instantaneously.

No. 333. WARNER, JOHN, AND SONS.

The noticeable exhibit under this number is the *valve closet*, with flushing rim and moveable valve seating, enabling new one to be put in without the taking down of basin in the usual way.

No. 311. WEARE, ROBERT.

Inodorous carbon closet commode.

No. 262. WHITE, WILLIAM, F.S.A.

This exhibit of water-closet is known as the "Shrewsbury."

The main feature consists in a special form of flushing cistern whereby the whole flush of water is tipped suddenly down the supply pipe to closet. The supply pipe is of larger diameter than usual and thereby gives good flush to closet pan.

No. 279. WILCOCK AND Co.

The disconnecting traps exhibited here are similar to many already described, and form useful syphons for disconnecting soil pipes and other wastes.

The sanitary trough closet (Holroyd's Patent) is made of strong stoneware, salt-glazed inside and outside. The shape on cross section is that of an egg-shaped sewer with crown removed. The only part of these closets not stoneware is the seat of pitch pine wood.

The division walls for separating such closet are lined with white glazed bricks giving great cleanliness.

The arrangement for charging and emptying the closets is such as to prevent waste of water. The valve chest, which may be fixed at one end or in the middle, and is under lock and key, is provided with a valve and seat with an overflow arrangement in case of neglect on the part of the attendant. The water is supplied through a brass tap, on which is screwed a hose for washing out each closet.

There is also an arrangement of flushing by a fixed perforated pipe running along each side of the trough at top, and by turning on a tap the trough is flushed throughout.

No. 323. WOODWARD, JAMES.

The "Wash out" closet basin, with flushing rim and trap, made of white glazed earthenware.

The Hopper closet basin with flush rim and trap.

Porcelain sinks for refreshment bars.

## SECTION XVI.

### WATER SUPPLY AND FILTRATION.

#### A.—WATER SUPPLY.

No. 243. TONKS, J. T.

*Glass Ball Valves.* Frictionless balanced supply valves. Cleanliness is promoted. The balls are always tight. The spindle or the lever of one of those shown is probably imperfectly guided, but the exhibit has merit and may be advantageously used.

No. 253. DOULTON AND CO.\*

*Self-closing non-concussion Valves.* These are liable to remain open with water containing small impurities, and they will not open with low pressures. Neat application of the same to cisterns of closets, made of metal and india-rubber.

\* In addition to No. 253, in List B.

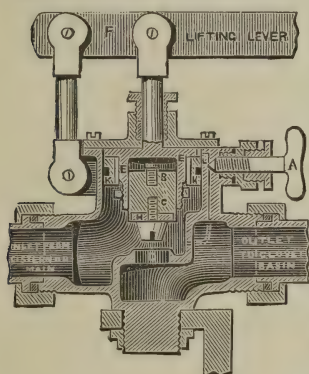


## No. 254. BEARD, DENT, AND HELLYER.

*Self-closing Valve* of American manufacture. Syphon waste preventer good, but not new.

## No. 256. TYLOR, J., AND SONS.

*Waste-not Valve* applied in various forms of water supply for cisterns, closets, courts, and alleys, etc. It is self-closing and yet can be closed by hand.



The diagram shows the Patent Waste-not Regulator Closet Valve. The action is as follows: when the handle of the closet is pulled up the lever F raises the socket EE, which carries with it the ring valve KK, and also the loose plunger C; when the closet handle is dropped the lever F (which is raised by it but not fixed to it) commences to fall, the speed of its descent being governed by the amount of water passing to the top of the valve KK through the passage L, the amount being regulated by the screw A.

If the Lever F is held or propped up the loose plunger C will gradually slide down and close the opening D, partly by its own gravity, and partly by the pressure of water getting above it.

This peculiar action of the water pressure getting above the plunger is demonstrated by the tap closing itself when placed wrong way upwards.

H is an india-rubber washer, forming the seating which closes the opening D.

Grooved joints without solder, and will stand any pressure. Hydrants, sluice valves, main stop valves for connecting supply pipes to street mains. Excellent workmanship. A water meter. One made of glass to show working parts.

## No. 257. JENNINGS AND CO.

*Neat Shampooing arrangement.* Ball trap made of india-rubber with glass door. This ball may become locked down to its seat. Good arrangement for periodically flushing urinals. Drawn lead pipes and traps made of lead and india-rubber (see also Section XV).

## No. 280. THAMES BANK IRON CO.

The sluice and hydrants shewn are of ordinary patterns, and with no special points of merit. The sluice has one unnecessary joint.

## No. 281. SHANKS AND CO.

Every kind of bath taps, combined and single. Lavatory taps. Ball taps in glass, top case made of brass. They are of the ordinary kind for their special uses, and are highly finished off in two or three kinds of metal and earthenware.

## No. 329. HAYWARD, TYLER, AND CO.

A great variety and large collection of valves and cocks for fire service, and pumps for testing water mains. Workmanship and make good. Also a badly shaped sluice valve.

## No. 331. EMANUEL, A., AND SONS.

Well finished and strong looking deep well pumps, valves, and cocks. Several good syphon and other form of waste preventers in gun metal and iron.

## No. 372. QUIRK, BARTON, AND CO.

Well made tin lined lead pipes. The tin and lead are laid and rolled together so that they are closely amalgamated, but the tin lining is very thin, so that if any crevice or small hole should exist in the tin galvanic action would set in and injure the pipe. They were of small bore.

## B.—FILTERS.

THE essential points of a good filter are the following:—

1. SIMPLICITY.
2. EFFICIENCY.
3. DURABILITY.

1. *Simplicity*.—When complicated apparatus is employed it is very apt to get out of order, and it also entails considerable expense. It is also difficult to get at the filtering medium for cleansing or renewal. A simple vessel, which will contain the filtering medium, is therefore the best.

2. *Efficiency*.—This is, of course, secured by obtaining a filtering medium which shall thoroughly remove impurity from drinking water, and at the same time yield nothing to the water which is likely to be injurious.

3. *Durability*.—The medium must be capable of acting efficiently for some reasonable length of time, so as to obviate the necessity of renewal too frequently.

The filters and media exhibited were the following :—

#### No. 253. DOULTON AND CO.

##### 1. *Manganous Carbon (Dr. Bernays' patent)*.

This is a block, made of animal charcoal and peroxide of manganese. The influence of the charcoal would be assisted by the peroxide, which is an oxidising agent. The form is open to the objections against block filters generally, viz.: their liability to clog, and ultimately to become useless from retaining organic matter in their interstices. Perhaps the manganese oxide might assist in preventing this.

2. *Aërating Patent Filter*, for fixing to stone cisterns (Bailey Denton's patent). The filtering materials are sand or fine gravel and animal charcoal. The chief feature is an arrangement by which a current of air reaches the filtering material, thus obviating the dangers of non-aëration.

#### No. 398. GARDNER, E. AND J.

##### *Filters. Filtering Materials.*

These are the filters and materials brought forward by Lieut.-Col. Crease, C.B., Royal Marine Artillery.

The filters are very simple, being cylinders of earthenware, without reservoir. Through the bottom passes a screw rod, by means of which the filtering material may be subjected to the necessary pressure by means of a perforated plate. The pressure regulates the rate of flow of the water through the filtering medium.

The filtering medium is *Carferal*, a substance, the exact composition of which has not yet been made known. It consists, however, of carbon, iron (ferrum) and clay (alumina), and from those constituents its name has been compounded. It is granular in form, and resembles animal charcoal in appearance. It has considerable power in removing organic matter from water, and it yields nothing to water. The filtering action is rapid, and it has fair durability.

#### No. 432. HOOPER AND CO.

*Carbon Blocks*, to soften water and to prevent incrustation in kettles and boilers.

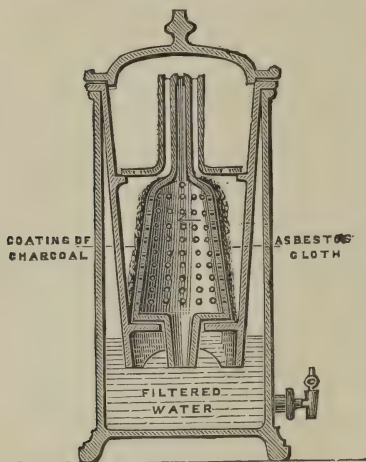
These could only act by allowing the calcium carbonate (chalk) to collect on their surfaces.

##### *Filters. Compressed vegetable carbon.*

Vegetable charcoal has long ago been shown to have very little efficacy in water filtration.

## No. 401. MAIGNEN, P. A.

*Filters.* Maignen's *Filtre Rapide* for purifying and aerating water.



This form of filter consists in principle of sheets of cloth spread over frames so as to expose as large a surface as possible to the water. The method was originally invented for filtering wine, and afterwards modified so as to be applicable to water. An improvement has been introduced by substituting *asbestos* cloth instead of canvas, as the latter tends to decompose and yield organic matter to the water. A form called the "Bijou" filter is introduced for the table, consisting of a cone of perforated earthenware instead of the frame above mentioned; over this cone is stretched a cap of asbestos cloth. Filtering

media are also employed, such as animal charcoal, the so-called "carbo-calcis" and others. The "carbo-calcis" consists of finely-powdered animal charcoal freed as much as possible from extraneous matter and treated with lime. This is mixed with some of the water and poured over the filtering cloth in as great quantity as may be thought necessary: it adheres to the cloth and forms a filtering medium of greater or less thickness. It is obvious that other media may also be used in the same way. For rapidity of filtration, especially for removal of suspended matter, the method would probably prove useful. The use of asbestos cloth has the great advantage that it may be cleaned thoroughly, and even exposed to the action of fire, to get completely rid of all organic matter.

## No. 401. MAGUIRE AND CO.

Maguire's *Patent Renewable Animal Charcoal Filters*, for domestic use.

These are simply earthenware cylinders, in which the lid of the section to contain the filtering medium is fitted in with a bayonet catch, and is easily removed for cleaning or renewal. The apparatus is made of earthenware throughout.

## No. 352. RAMSEY, WILLIAM.

*Filters, glass and Charcoal.*

These present no special feature.



## No. 286. SANITARY ENGINEERING AND VENTILATION COMPANY.

*Cistern Filters, Portable Filters, Table Filters.*

These filters are made with solid carbon blocks as the media, so-called *Silicated Carbon*, or animal charcoal mixed with silica (sand or powdered flint) and compressed into a solid form. They are so arranged that the parts are all accessible for cleansing and renewal; and provision is also made for the access of air to the filtering medium.

## No. 402. SILICATED CARBON FILTER COMPANY.

1. *Filtering Medium, Silicated Carbon.*2. *Filters, Domestic Filters, Ascension Filters, Table Filters.**Pocket Travelling Filters.*

*Main and constant-supply Filters*, for placing under cistern, or attaching to main.

The silicated carbon is a solid block, of which animal charcoal is the active ingredient. All blocks are apt to clog rapidly, especially if the water passed through contain much suspended matter. Attempts to obviate this have been made by passing the water first through sponge; but this is not successful, for the sponge soon gets foul, and becomes itself a source of impurity. The Silicated Carbon Company have made an improvement by introducing asbestos into their filters instead: by that means the suspended matter is kept out, while the asbestos itself not only does not favour decomposition, but may be exposed to fire, when required, so as to purify it thoroughly. Block filters require cleaning by scraping or brushing, by passing distilled or quite clear water through them in an opposite direction to the usual current, or by passing a solution of potassium permanganate (Condy's fluid) and weak mineral acid (hydrochloric or sulphuric) through them, and then rinsing well with distilled water. Filtration through them is comparatively slow, taking about fifteen minutes on an average; whereas loose animal charcoal, carfural, or other similar granular substances, filter much more rapidly.

Pocket filters of all kinds soon have their power exhausted if the water used is markedly impure. They are useful, however, as strainers of suspended matter.

## No. 269. SMITH, THOMAS AND COMPANY.

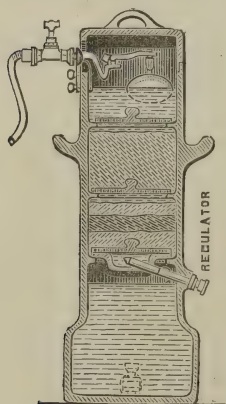
*Filters.*

These have the objection that the filtering medium is cemented in and is not accessible.

## No. 400. SPONGY IRON DOMESTIC FILTER COMPANY.

*Water Filters.*—Domestic Spongy Iron Filters of different constitution, made of spongy (metallic) iron, prepared sand, and stone-ware filter cases.

These filters are different from most others in the market in their construction, as well as in the medium employed. The latter is spongy iron, a substance granular in appearance, and not unlike animal charcoal externally. About 26 cubic feet of it go to the ton. It is iron, chiefly in the metallic state, obtained by the roasting of hæmatite. Its action upon water, even in the cold, is like that produced by passing steam over red-hot iron, viz. : the iron is oxidised, and hydrogen is set free. The iron oxide then probably yields its oxygen in whole or in part to the organic matter in the water, and destroys it. In doing so, however, it also impregnates the water to a certain extent with iron. This is got rid of in these filters by causing the filtered water to pass through a layer of "prepared sand," which consists of very fine gravel or coarse sand, mixed with a proportion of *pyrolusite*, or crude manganese peroxide. This removes the traces of iron. The media also remove traces of lead from water.



The filtering process is rather slow, the rate being purposely slackened in order to effect thorough purification: about 22 minutes being the average time. The reservoir of the filter is filled through a minute perforation in a pipe which passes through it. This pipe can be opened from without, and cleaned by means of a brush, or it can be removed, and the small aperture cleaned. It is made of pure tin, the rest of the apparatus being earthenware. By a syphon arrangement the water is prevented from falling below a certain level, by which means the spongy iron is always kept wetted. This obviates the inconvenience of its drying up and caking so as to impede the flow of water. These filters can also be connected with the pipe of a constant supply or cistern, and be arranged to work with a ball-cock. The action of the medium is very powerful, and it is also durable, depending of course upon the character of the water passed through. Under ordinary circumstances the material may be renewed about once a twelvemonth.

Spongy iron has the advantage of yielding nothing to water likely to favour decomposition or the propagation of organic life. Animal charcoal, on the other hand, although a powerful filtering medium, is apt to yield phosphates to water, which tend to favour organic life,—so that water which has been filtered through it may become impure if stored. Water filtered through spongy iron may apparently be stored with impunity.

# EXAMINATIONS IN SANITARY SCIENCE FOR LOCAL SURVEYORS AND INSPECTORS OF NUISANCES.

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## BOARD OF EXAMINERS.

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THE great and increasing importance of the duties devolving upon Local Surveyors and Inspectors of Nuisances in connection with the various Acts relating to Public Health, the Sale of Food and Drugs Act, &c., has led the Council of the Sanitary Institute of Great Britain to establish Voluntary Examinations, to appoint a Board of Examiners, and to grant Certificates of Competency to Local Surveyors and Inspectors of Nuisances.

Visitors duly appointed by the Local Government Board and various bodies connected with the practical application of sanitary science are invited to be present at the Examinations.

The Examinations, which are arranged in two grades, are intended to enable Local Surveyors and Inspectors of Nuisances, or persons desirous of becoming such, or of obtaining the Certificate of the Institute, to prove their competency in the subjects of Examination. Successful Candidates will be placed on the Register of persons so certificated; this Register will be kept at the Offices of the Institute, and a copy will be forwarded to Local Boards and Sanitary Authorities on application.

Each Examination occupies a portion of two days. On the first day the Examination of Surveyors occupies four hours—viz., from 2 till 4, and from 6 till 8 p.m., and consists of written papers only. Inspectors of Nuisances have two hours' written examination on the first day—viz., from 4 till 6 p.m. On the second day the Examination, for both classes, commences at 11 a.m., and is *vivâ voce*,

with one or more questions to be answered in writing, *if deemed necessary*. A Certificate of competency, signed by the examiners, is granted to successful Candidates, entitling them to be designated as "Certificated by the Sanitary Institute of Great Britain."

As Rural Sanitary Authorities are able, under the Public Health Act, 1875, to obtain almost all the powers of Urban Sanitary Authorities, it is not considered advisable to make any distinction in the examination of the two classes of Surveyors.

As one person may, under the Public Health Act, 1875, be both Local Surveyor and Inspector of Nuisances, Candidates wishing to obtain the double qualification may enter for both Examinations on the same occasion.

Candidates are required to furnish to the Board of Examiners satisfactory testimonials as to personal character, and to give two weeks' notice to the Registrar previous to presenting themselves for Examination, stating whether they wish to be examined as Surveyors, as Inspectors of Nuisances, or as both. The fee for Examination must be paid to the Secretary, by Post-Office order or otherwise, at least six days before the day of Examination. On the receipt of the fee, a ticket will be forwarded admitting to the Examination.

The fees payable for the Examinations are as follows:—

For Surveyors . . . . . £5 5s.

For Inspectors of Nuisances . . . £2 2s.

Unsuccessful Candidates are allowed to present themselves a second time for one fee.

Examinations during the year 1882 are appointed to be held at the Rooms of the Institute:—

On Thursday and Friday, November 2nd and 3rd, 1882.

On Thursday and Friday, June 7th and 8th, 1883.

Forms to be filled up by Candidates previous to Examination will be supplied on application to the Secretary, 9, Conduit Street, W.

## SYLLABUS of SUBJECTS for EXAMINATION.

### FOR LOCAL SURVEYORS.

**LAWS AND BYE-LAWS**—A thorough knowledge of the Acts affecting Sanitary Authorities, as far as they relate to the duties of Local Surveyors; also, of the Model Bye-Laws issued by the Local Government Board.

**SEWERAGE AND DRAINAGE**—The Sanitary principles which should be observed in the preparation of schemes for, and the construction of, Sewerage works; the ventilation and flushing of sewers and drains; the internal drainage and other Sanitary arrangements of houses, privies, water-closets, dry-closets, and the removal of refuse; the Sanitary details of Builders' and Plumbers' work.



**WATER SUPPLY OF TOWNS AND HOUSES**—The Sanitary principles which should be observed in the preparation of schemes for, and the construction of, Water-works; the various ways in which water is likely to become polluted, and the best means of ensuring its purity.

**REGULATION OF CELLAR DWELLINGS AND LODGING HOUSES**—General principles of Ventilation; the amount of air and space necessary for men and animals; the means of supplying air, and of ensuring its purity.

**HIGHWAYS AND STREETS**—The Sanitary principles which should be observed in the construction and cleansing of streets and roads.

All persons who have passed the above Examination and received the Certificate for the First Grade are, by virtue of having so passed, entitled to become Members of the Institute for Life, upon payment of Five Guineas (without Annual Subscription), in addition to the fee paid for the Examination.

### FOR INSPECTORS OF NUISANCES.

A thorough knowledge of the Provisions of the Acts and Model Bye-Laws relating to the duties of Inspector of Nuisances—also of the working of the Sale of Food and Drugs Act.

A fair knowledge of the principles of Ventilation, and the simple methods of Ventilating Rooms—Measurement of Cubic Space.

A knowledge of the Physical Characteristics of Good Drinking Water—the various ways in which it may be polluted, and the means of preventing pollution—Methods of Water Supply.

A knowledge of the proper conditions of good drainage.

The advantages and disadvantages of various Sanitary Appliances for Houses—Inspection of Builders' and Plumbers' work.

A knowledge of what constitutes a Nuisance, arising from any Trade, Business, or Manufacture.

A fair knowledge of the characteristics of good and bad Food (such as Meat, Fish, Milk, Vegetables), so as to be able to recognise unsoundness.

Some knowledge of Infectious Diseases, and of the Regulations affecting persons suffering or recovering from such diseases.

A knowledge of the best Methods of Disinfection.

Methods of Inspection, not only of Dwellings, Dairies, and Milk-Shops, but of Markets, Slaughter-Houses, Cow-Sheds, and offensive Trades.

Scavenging and the Disposal of Refuse.

All persons who have passed the above Examination and received the Certificate for the Second Grade are, by virtue of having so passed, entitled to become Associates of the Institute for Life, upon payment of Three Guineas (without Annual Subscription), in addition to the fee paid for the Examination.

# LIST OF BOOKS SUGGESTED BY THE EXAMINERS AS USEFUL TO CANDIDATES.

## SURVEYORS.

### LAWS AND BYE-LAWS.

The principal Acts affecting Sanitary Authorities, viz:—

Gas Works Clauses Acts, 1847.	Price 6d.	} <i>Sold by Eyre &amp; Spottiswoode.</i>
Water Works „ „ 1847.	Price 1s.; & 1863, price 3d.	
Public Health Act, 1875.	Price 5s. 7½d.	
„ „ Water, 1878.	Price 4½d.	
Rivers Pollution Act, 1876.	Price 6d.	
Artizans' and Labourers' Dwelling Acts, 1868.	Price 7½d.; and 1875, price 1s.	

Local Government Board. Model Bye-Laws for Sanitary Authorities. *Eyre & Spottiswoode.* Price 4s. 6d.

†CHAMBERS, GEORGE F. Digest of the Law relating to Public Health and Local Government. 7th Edition. *Stevens & Son.* Price £1 8s.

†FITZGERALD, VESEY. Public Health Act and Local Government Act, 1875. 3rd Edition. *Waterlow Bros. & Layton.* Price 12s. 6d.

†GLEN, W.C., Q.C. Public Health Act. *Knight.* Price £1 16s.

†LUMLEY. Public Health Act, 1875. *Shaw & Son.* Price £1 5s.

†MICHAEL & WILL. On Gas and Water. *Butterworth.* Price £1 5s.

STRATTON'S Public Health Acts, 1875. 1880 Edition. *Knight.* Price 3s. 6d.

†WOOLRYCH. On the Metropolis Local Management Acts. 2nd Edition. *Shaw & Son.* Price £1 1s.

### SEWERAGE AND DRAINAGE.

BOULNOIS, H. P., M.INST.C.E. Dirty Dust-Bins and Sloppy Streets. *E. & F. N. Spon.* Price 3s. 6d.

BUCHAN, W. PATON. Plumbing. *Crosby, Lockwood & Co.* Price 3s. 6d.

DENTON, J. BAILEY, M.INST.C.E. Sanitary Engineering. *E. & F. N. Spon.* Price £1 5s.

FIELD, ROGERS, M.INST.C.E. Bye-Laws and Regulations with reference to House Drainage. *E. & F. N. Spon.* Price 1s.

FOX, CORNELIUS B., M.D. Disposal of the Slop Water of Villages. *J. & A. Churchill.* Price 1s. 6d.

GALTON, DOUGLAS, C.B., F.R.S. Observations on the Construction of Healthy Dwellings. *Henry Frowde.* Price 10s. 6d.

HELLYER, S. S. The Plumber, and Sanitary Houses. 2nd Edition. *B. S. Batsford.* Price 10s. 6d.

- LATHAM, BALDWIN, M.INST.C.E. Sanitary Engineering. *E. & F. N. Spon.*  
*Price £1 10s.*
- RAWLINSON, ROBT., C.B. Suggestions as to Drainage, Sewerage, and Water Supply. *Knight.* *Price 3s.*
- †Report of the Committee of The Local Government Board on Treatment of Town Sewage. *Hansard & Co.* *Price, Report 1s.; Plans 10s.*
- RUSSELL, J. A. Two Lectures to Builders and Plumbers. *Simpkin, Marshall & Co., 1878.* *Price 1s. 6d.*

### WATER SUPPLY OF TOWNS AND HOUSES.

- †BUCHAN, A. Introductory Text Book of Meteorology. 2nd Edition. *W. Blackwood & Sons.* *Price 4s. 6d.*
- †HUMBER, WILLIAM, ASSOC.M.INST.C.E. Water Supply of Cities and Towns. *Crosby, Lockwood & Co.* *Price £6. 6s.*
- PARRY, JOSEPH, C.E. Water: its Composition, Collection, and Distribution. *F. Warne.* *Price 2s. 6d.*
- †Sixth Report of the Royal Commissioners on Pollution of Rivers. *Hansard & Co.* *Price 16s.*

### REGULATION OF CELLAR DWELLINGS AND LODGING HOUSES, VENTILATION, &C.

- GALTON, DOUGLAS, C.B., F.R.S. Observations on the Construction of Healthy Dwellings. *Henry Frowde.* *Price 10s. 6d.*
- HARTLEY, W. NOEL. Air and its Relation to Life. *Longmans, Green & Co.* *Price 6s.*
- †PARKES, E. A., M.D., F.R.S., and F. DE CHAUMONT, M.D., F.R.S. A Manual of Practical Hygiene (Chapters on Air). *J. & A. Churchill.* *Price 18s.*

### HIGHWAYS AND STREETS.

- BOULNOIS, H. P., M.INST.C.E. Dirty Dust-Bins and Sloppy Streets. *E. & F. N. Spon.* *Price 3s. 6d.*
- CODRINGTON, T., M.INST.C.E. Maintenance of Macadamised Roads. *E. & F. N. Spon.* *Price 6s.*

### GENERAL.

- †PARKES, E. A., M.D., F.R.S., and F. DE CHAUMONT, M.D., F.R.S. A Manual of Practical Hygiene. *J. & A. Churchill.* *Price 18s.*
- †WILSON, G., M.A., M.D. Handbook of Hygiene and Sanitary Science. *J. & A. Churchill.* *Price 10s. 6d.*

## INSPECTORS OF NUISANCES.

The Principal Acts relating to the Duties of Inspectors, viz :—

Public Health Act, 1875. Price 5s. 7½d.	} Sold by Eyre & Spottiswoode.
" " Water, 1878. Price 4½d.	
Canal Boats Act, 1877. Price 3d.	
Sale of Food and Drugs Acts, 1875. Price 6d.; and 1879, price 3d.	
Rivers Pollution Act, 1876. Price 6d.	
Artizans' and Labourers' Dwellings Acts, 1868. Price 7½d.; and 1875, price 1s.	
Alkali, &c., Works Regulations Act, 1881. Price 5d.	
Nuisances Removal Acts, 1855. Price 1s.; 1860, price 3d.; and 1866, price 1½d.	

Local Government Board. Model Bye-Laws for Sanitary Authorities. *Eyre & Spottiswoode. Price 4s. 6d.*

Local Government Board. General Orders relating to Duties of Inspectors of Nuisances, issued March 10th and 13th, 1880.

Metropolitan Board of Works. Bye-Laws under the Slaughter-houses, &c., Act; eight in number.

Metropolitan Board of Works. The Dairies Cowsheds, and Milkshops Order of July, 1879.

STRATTON'S Public Health Acts, 1875. 1880 Edition. *Knight. Price 3s. 6d.*

†WOOLRYCH. On the Metropolis Local Management Acts. 2nd Edition. *Shaw & Son. Price £1. 1s.*

BOULNOIS, H. P., M.INST.C.E. Dirty Dust-Bins and Sloppy Streets. *E. & F. N. Spon. Price 3s. 6d.*

CORFIELD, W. H., M.A., M.D. The Laws of Health. *Longman & Co. Price 1s. 6d.*

CORFIELD, W. H., M.A., M.D. Dwelling Houses: their Sanitary Construction and Arrangements. *H. K. Lewis. Price 3s. 6d.*

F. DE CHAUMONT, F.S.B., M.D., F.R.S. Manuals of Health. The Habitation in Relation to Health. *Society for Promoting Christian Knowledge. Price 1s.*

FIELD, ROGERS, M.INST.C.E. Bye-Laws and Regulations with Reference to House Drainage. *E. & F. N. Spon. Price 1s.*

HARTLEY, W. NOEL. Water, Air, and Disinfectants. *Society for Promoting Christian Knowledge. Price 1s.*

†PARKES, E. A., M.D., F.R.S., and F. DE CHAUMONT, M.D., F.R.S. A Manual of Practical Hygiene. (Chapters on Water, Air, Food, and Sewage). *J. & A. Churchill. Price 18s.*

† Books marked thus are Works of Reference.

It is not necessary that Candidates should study all the works mentioned in this List, as two or three are quoted in some subjects to afford greater facilities for obtaining the information.



### CANDIDATES WHO HAVE RECEIVED CERTIFICATES AS LOCAL SURVEYORS.

- 1880, Nov. 5, BOULNOIS, H. PERCY, M.INST.C.E., Exeter.  
 1880, Nov. 5, BURTON, W. KINNINMOND, Adam Street, Adelphi.  
 1879, June 4, CAMERON, DONALD, Exeter.  
 1880, June 2, CLARE, JESSE, Sleaford.  
 1878, June 5, GAMBLE, S. G., A.M.I.C.E., Grantham.  
 1881, June 3, GRIMLEY, SAMUEL S., Ashby-de-la-Zouch.  
 1878, Nov. 7, HARGER, R., Skipton.  
 1880, Nov. 5, HARLAND, A., A.R.I.B.A., High Barnet.  
 1882, June 9, HUBBER, FRANK, Exeter.  
 1880, Nov. 5, INNES, COSMO, M.INST.C.E., Adam Street, Adelphi.  
 1878, June 5, JENKINS, W. J. P., Bodmin.  
 1880, June 2, NICHOLS, H. B., Handsworth.  
 1877, Oct. 29, PARKER, J., Town Hall, Bridgewater.  
 1877, Oct. 29, ROBINSON, H. W., Ulverston.  
 1879, June 4, TOUZEAU, E. M., Strand, W.C.  
 1881, June 3, WHITCOMBE, A., A.R.I.B.A., John St., Adelphi.  
 1882, June 9, WITTS, J. W., Market Harborough.

### CANDIDATES WHO HAVE RECEIVED CERTIFICATES AS INSPECTOR OF NUISANCES.

- 1882, June 9, ABRAMS, H., Arthur Road, South Hornsey.  
 1882, June 9, ATKINS, W., Kettering.  
 1882, June 9, BAXTER, J., Walnut Tree Walk, S.E.  
 1877, Oct. 29, BLANCHARD, THOMAS, Evesham.  
 1879, Nov. 7, BOLT, BENJAMIN, Aston, Birmingham.  
 1877, Oct. 29, BOOKER, F., St. Mary's Hall, Coventry.  
 1878, Nov. 7, CHUBB, T. T., Whitchurch.  
 1880, June 2, CLARE, J., Sleaford.  
 1879, Nov. 7, CLARKE, A. LENNOX, Union Buildings, Selly Oak.  
 1881, June 3, COWDEROY, J. T., Wolverhampton.  
 1878, June 5, DALE, T. H., Town Hall, Hull.  
 1878, Nov. 7, DAVIES, H., Wrexham.

- 1882, June 9, FAIRCHILD, S. G., Chesson Road, W., Kensington.  
 1882, June 9, FINLAY, A., Town Hall, Scarborough.  
 1878, Feb. 7, GANDER, C., Alcester.  
 1880, Nov. 5, HARLAND, A., High Barnet.  
 1878, Nov. 7, HARRIS, W., Solihull.  
 1878, June 5, HAWKES, C., Hackney  
 1881, Nov. 4, HORROCKS, J.  
 1879, Nov. 7, LAPWORTH, J., Bethnal Green.  
 1882, June 9, LIGHTFOOT, F., Trevor Square, Knightsbridge.  
 1879, Nov. 7, OSBORNE, J., Carlisle.  
 1877, Oct. 29, PREBBLE, W. S., Blackburn.  
 1881, June 3, RAINS, J., Kettering.  
 1878, Feb. 7, ROBINSON, J., Farm Street, Berkeley Square.  
 1881, Nov. 4, SORTWELL, W., Retreat Place, Hackney.  
 1882, June 9, STEERS, G., Wellington Street, Bedford.  
 1878, Feb. 7, WATTS, W. F., South Stoneham.  
 1878, Feb. 7, WETHERILL, W., Norfolk Street, Batley.  
 1878, Feb. 7, WILKINSON, W., Salford.  
 1881, June 3, WILKINSON, W., Bury, Lancashire.  
 1881, Nov. 4, WITTS, J. W., Market Harborough.  
 1882, June 9, WRIGHT, NOAH, Coventry.
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## EXAMINATION QUESTIONS, 1881.

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The following questions were required to be answered in writing.  
A *viva voce* examination took place on the following day.

**JUNE 2nd, 1881.**

**SURVEYORS—PAPER I. 2 TO 4 P.M.**

1.—What is a Provisional Order? When does it become law, and for what purposes may it be obtained?

2.—What are the most important provisions of the Public Health Act of 1875? How have they been modified by subsequent legislation?

3.—How are sewers ventilated in towns? Why are they ventilated? State the objections which have been made to the systems adopted, and criticise those objections. Illustrate your answers by sketches.

4.—Mention some of the plans used for flushing sewers in cases where a sufficient fall is impossible, and give your opinion on their practicability and sanitary advantages. State the objects to be obtained by flushing. To what extent does the admission of storm waters into sewers affect the question of flushing?

5.—If you are called upon to report whether or not the connections of the drainage of a house with the sewers have been properly made, in a town which has adopted the model bye-laws of the Local Government Board, to what points would you more particularly direct your attention? Illustrate your answer by sketches.

6.—How would you propose to deal with the excreta and slop waters in villages and isolated houses?

**SURVEYORS—PAPER II. 6 TO 8 P.M.**

1.—How is water filtered on a large scale for town supply? Illustrate your answer by sketches, and also state under what circumstances such filtration is likely to purify water sufficiently for health.

2.—What is meant by constant water service? How may water become polluted in places where this system is adopted?

3.—State the supply of water per head which you consider necessary—

(a) For an urban district?

(b) For a rural district?

What proportion of this is generally used and what proportion wasted? Which is the more economical (as regards the expenditure of water), the constant or the intermittent system?

4.—What amount of fresh air must be supplied per hour for each individual for health? To what extent and in what manner does the quantity depend on the size of the room in relation to the number of occupants? Explain by one example how your result is arrived at.

5.—What are the objections to “made soils” as foundations for houses? What precautions would you take in respect to them? What are the chief causes of dampness in dwellings? How is dampness to be prevented or remedied?

6.—Under what circumstances could a new building be condemned as unfit for occupation?

#### INSPECTORS OF NUISANCES.—4 TO 6 P.M.

1.—A nuisance having been reported to exist in a certain house, what steps would you take? What is meant by a recurring order?

2.—What are the provisions of the Public Health Act with regard to the exposure of infected persons and things?

3.—Describe the method of measuring the available air space in rooms. How much air space is desirable? How much should be insisted on?

4.—How is water likely to be contaminated—

(a) In wells in a country district?

(b) In cisterns in houses?

How can such contamination be prevented?

5.—Mention the various disinfectants in common use, and state which you consider the best for particular purposes? Describe the methods of use and the precautions necessary.

6.—What are the objects of a water trap? Describe good and bad forms of traps. What is meant by disconnection of waste-pipes, and what are its objects?

7.—Describe the duties of an Inspector of Nuisances with regard to food exposed for sale in his district?

8.—Describe any manufacturing process which is liable to be a nuisance. How would you deal with it?

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#### NOVEMBER 3rd, 1881.

#### SURVEYORS—PAPER I. 2 TO 4 P.M.

1.—State the conditions under which the discharge of sewage matter into streams is prohibited by the Rivers Pollution Prevention Act, and also the conditions under which such discharge is not prohibited by this Act. Explain what is the meaning of a “stream” under the Act.

2.—Is foul air more likely to be found in the sewers of a town or of a village? and why? What are the best means of preventing its formation?



3.—What are the relative advantages and disadvantages of pipe and brick sewers? How can the objections to pipe sewers be overcome? Illustrate your answer by sketches.

4.—How much sewage would pass in twenty-four hours through a sewer of 8-ins. diameter, laid at an inclination which would give a velocity of 3-ft. per second, and what population would this sewer suffice for in a town with a public water supply where the rain and surface water, other than that from the roofs and paved yards of houses, is carried off by a separate system? Give your calculation in full.

5.—Draw the scheme of drainage you would suggest on the accompanying plans of a dwelling-house, and give sketches of the various traps you would employ, of the method of laying the drain and of its connection with the sewer, accompanied by a short description of the mode of executing the work you propose.

#### SURVEYORS—PAPER II. 6 TO 8 P.M.

1.—If asked to advise as to the water supply of a town, what are the chief points to which you would direct your attention, if the supply is to be derived.

(a) From wells?

(b) From streams?

2.—Describe the construction of an ordinary rain gauge, and the precautions which should be taken in fixing it. Give instances of the amount of annual rainfall in various places. What weight of water does one inch of rain on an acre represent?

3.—What materials are used for the construction of cisterns and water pipes, and what are the advantages and disadvantages of each?

4.—Explain what is meant by ventilation of rooms? How far does the size of a room affect the question? Given, a room 12-ft. by 10-ft. by 10-ft. high, occupied by three persons, what means of ventilation would you adopt? To what extent would they be efficient?

5.—Write a specification for the construction of a macadamized road, 40-ft. wide, with 6-ft. foot-way on each side, across an estate on a clay soil, with cross section, and estimate of cost per foot run.

#### INSPECTORS OF NUISANCES—4 TO 6 P.M.

1.—Mention the principal Acts relating to the Public Health, and state briefly their most important provisions.

2.—What is the order of procedure prescribed by the Sale of Food and Drugs' Act in obtaining for analysis samples of articles suspected of being adulterated?

3.—Describe some simple means of ventilating sleeping rooms which you think would be efficient. What do you consider overcrowding?

4.—What are the physical characteristics of good drinking water?

5.—A house is found to be unhealthy, there are occasionally (not

always) offensive smells, perceived both in the basement and in the upper rooms; what is the most likely cause of this, and how would you proceed to investigate it?

6.—How should the soil pipes, sink pipes, and overflow pipes of a dwelling be dealt with so as to prevent any danger to the inmates? What do you consider a proper fall for a six inch house drain?

7.—How would you proceed to disinfect a house in which a case of Typhus Fever or Small Pox had occurred?

8.—In the inspection of a slaughter house, to what points would you specially direct your attention? What are the requirements of a properly constructed slaughter house?

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# EXHIBITIONS OF SANITARY APPARATUS AND APPLIANCES.

THE Exhibitions of Sanitary Appliances are held annually in connection with the Autumn Congress, and unpatented exhibits are protected by a certificate granted by the Board of Trade, under the Protection of Inventions Act, 1878.

Judges are appointed by the Council to examine the several exhibits, and award Medals and Certificates of Merit to such objects as they may consider worthy.

In addition to the Ordinary Medals, a special Medal—the Richardson Gold Medal—is offered by the Institute, for a selected exhibit from the entire exhibition, and will be awarded by the Judges in cases of pre-eminent merit only. Selected exhibits of such a nature as to require practical trials which cannot be carried out on the spot, are submitted to such trials upon the Exhibitors defraying the necessary expenses.

The Exhibits are arranged in the following Classes:—

## CLASS I.—CONSTRUCTION AND MACHINERY.

Construction and Materials.  
Paints and other Protectives.  
Wall Papers.  
Decorative Materials.  
Machinery adapted for Sanitary Purposes.  
Washing Machines.

## CLASS II.—SEWERAGE AND WATER SUPPLY.

Water Closets.  
Dry Closets.  
Urinals.  
Sewage Treatment.  
Traps.  
Sinks.  
Baths and Lavatories.  
Apparatus for Water Supply.  
Cisterns.  
Flushing and Watering.  
Miscellaneous Sanitary Goods.

## CLASS III.—HEATING, LIGHTING, AND VENTILATION.

Heating Apparatus.  
Cooking Apparatus.

Smoke Preventing Appliances.  
Lighting, including Electric Lighting.  
Ventilation.

## CLASS IV.—PERSONAL HYGIENE, FOODS AND DISINFECTANTS.

Clothing.  
Beds, &c.  
Educational Appliances.  
Domestic Appliances.  
Foods.  
Filters, and Arrangements for Softening Water.  
Mineral Waters.  
Disinfectants.  
Disinfecting Apparatus.

## CLASS V.—MISCELLANEOUS.

*Articles of Sanitary interest not included in the above Classes, such as:—*

Scientific Instruments.  
Books on Sanitation.  
Prevention of Accidents.  
Methods for the Disposal of the Dead, &c., &c., &c.

The following are the Regulations made for the Exhibition at Newcastle-upon Tyne, in September, 1882 :—

- 1.—The Scale of Charge for Floor Space will be 7s. 6d. per foot frontage, with a depth of six feet; Wall Space 6d. to 1s. per square foot; Corners and Special Places will be charged at higher rates. No Floor Space will be allotted for a less sum than 15s., or Wall Space for less than 5s. All charges must be paid at the time of Allotment.
- 2.—Applications for Space must be made on the official form, and under the proper class. They must be sent to Mr. E. L. Box, the Curator of the Exhibition, at the Offices of the Institute, 9, Conduit Street, Regent Street, London, W., not later than Saturday, August 26th, 1882. No application after this date will be received unless accompanied by an extra payment of 5s. per foot frontage.
- 3.—A full and accurate description of the articles proposed to be shown must be forwarded with each application for space. (*See* No. 12.)
- 4.—The Exhibition Committee reserve the right to refuse, or order the removal of, any article not deemed suitable.
- 5.—Under the supervision and control of the Curator, Exhibitors will be permitted to erect benches or other contrivances for displaying their exhibits, but will be responsible for the removal of their Exhibits and Fittings at the close of the Exhibition, and must make good, to the satisfaction of the Borough Surveyor, any damage caused thereby.
- 5a.—Gas and Water will be supplied to the Exhibitors, for use in connection with their Exhibits, and charged for by the Institute. Efficient drainage is provided.
- 6.—Every Article exhibited shall bear a descriptive label, corresponding with the description forwarded with the application (*See* No. 3), and giving also the retail price at which the article can be obtained. The objects exhibited shall be either the actual Articles, Models, or Drawings.
- 7.—In addition to Articles and Inventions of a strictly technical character, articles of a general character relating to domestic comfort and economy, and life and labour saving apparatus, as well as books, drawings, and photographs, illustrative of the same, may be exhibited.
- 8.—Exhibitors will be permitted to employ persons to explain their exhibits, and such persons may receive orders, but will be prohibited from soliciting them.
- 9.—The Committee will not be responsible for insurance against fire, or in any way for the safety of any articles exhibited. The cost of conveying goods into, placing them in position in, and removing them from, the Exhibition, including unpacking and packing, must be borne by the Exhibitors.
- 10.—The position occupied by each Exhibitor will be determined by the Committee.
- 11.—Exhibits will be received at the Exhibition Building, Newcastle, from Tuesday, September 12th, to Tuesday, September 19th. Exhibits arriving after September 19th will only be admitted on payment of a fine of 5s. per foot frontage; but no exhibit will, under any circumstances, be admitted after Friday, September 22nd. No exhibits shall be removed before MONDAY, the 23rd of OCTOBER, and all exhibits must be removed by WEDNESDAY, the 25th OCTOBER.
- 12.—A Catalogue will be published under the authority of the Committee, mainly compiled from the information given by the Exhibitors on their application forms. A few pages in the Catalogue will be reserved for approved Advertisements. Terms for Advertisements (payable in advance):—Whole Page, £2; Half Page, £1. 5s.; Quarter Page, 15s. Particulars of Advertisements to be forwarded to the Curator not later than TUESDAY, 12th SEPTEMBER, 1882. An extra payment of 5s. must accompany every Advertisement forwarded after that date.



- 13.—PRIZE MEDALS and CERTIFICATES OF MERIT will be awarded at the discretion of the Judges, and their decisions will in all cases be final. The List of Awards will be published in the Transactions of the Institute for 1882.
- 14.—It may be impossible for the Judges to come to a satisfactory decision as to the merits of certain exhibits without practical trial, involving special testing and other investigations. In all such cases the following regulations will be adopted:—
- (a) The Judges have power to take from the Exhibition any specimens they may require for testing.
  - (b) The Judges will select such Exhibits for further practical trial as they may deem desirable. Exhibitors of such selected Exhibits will then be communicated with, and if they desire to submit their Exhibits to a deferred practical trial they will be required to pay such an Entrance Fee as the Committee may determine, to defray the necessary expenses of testing the Exhibits; and also to furnish the Committee with a written or printed statement of the grounds upon which they claim special merit for their Exhibits.
- 15.—THE RICHARDSON MEDAL *for an EXHIBIT SELECTED FROM THE ENTIRE EXHIBITION will be awarded by the Judges in case of pre-eminent merit only.*
- 15a.—SILVER MEDALS OFFERED BY THE EXETER GAS COMPANY.—Three Silver Medals are offered by the Exeter Gas Company for best Gas Stoves exhibited under the following classes:—
1. For the best Gas Stove or Gas Apparatus for cooking purposes for families, including a sufficient supply of hot water.
  2. For the best Gas Cooking Stove for an artisan's family of from four to eight persons.
  3. For the best and most economical Open Gas Fire.
- 16.—Protection in accordance with the Protection of Inventions Act, 1870, will be obtained from the Board of Trade for persons desirous of Exhibiting New Inventions.

Table giving particulars with reference to the exhibitions already held.

TABLE A.

	1877. Leamington.	1878. Stafford.	1879. Croydon.	1880. Exeter.
Number of Exhibitors ... ..	117	116	189	106
„ of Exhibits ... ..	294	319	710	500
Space occupied (in square ft.) ... ..	.....	.....	.....	9725
Number of days Exhibition was open... ..	14	16	17	19
Total number of Visitors ... ..	.....	.....	.....	8955
Number of Medals awarded ... ..	13	13	12	12
Number of Certificates awarded ... ..	None.	27	47	47
Number of Exhibits deferred for further trial ... ..	.....	7	52	30

# CLASSIFIED LIST OF MEDALS AWARDED AT THE EXHIBITIONS.

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## RICHARDSON MEDAL.

- STAFFORD, 1878. SILICATE PAINT COMPANY, *Cannon Street, E.C.*, for Griffiths' Patent White.
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## SILVER MEDAL.

Offered by the Exeter Gas Company.

- EXETER, 1880. SANITARY & ECONOMIC SUPPLY ASSOCIATION, for Dr. Bond's Euthermic Ventilating Gas Stove.
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## CLASS I.—CONSTRUCTION AND MACHINERY.

### (1). Construction and Materials.

- CROYDON, 1879. WILLCOCKS & Co., *Burmantofts, Leeds*, for Silica Glazed and Enamelled Fire Clay Bricks and Faience.

### (2). Paints and other Protectives.

- STAFFORD, 1878. SILICATE PAINT COMPANY, *Cannon Street, E.C.*, for Griffiths' Patent White, and for their preparations of Silicate Paint, Enamel Paint, and Petrifying Liquid.

### (3). Wall Papers.

- CROYDON, 1879. WOOLAMS & Co., *High Street, Marylebone*, for Paper Hangings free from Arsenic.

### (4). Decorative Materials.

- EXETER, 1880. WEBB, H. CHALK, *Worcester*, for Colouring Patterns through the Substance of Wood.

### (5). Machinery adapted for Sanitary Purposes.

- CROYDON, 1879. AVELING & PORTER, *Rochester*, for Improved Six-Ton Steam Road Roller.

### (6). Washing Machines.

- LEAMINGTON, 1877. BORWELL, J., *Britannia Foundry, Burton-on-Trent*, for Improved Washer, with table complete.

- LEAMINGTON, 1877. BRADFORD, T. & Co., *High Holborn, W.C.*, for New Patent "Shuttle" Steam Power Washing Machine.

## CLASS II.—SEWERAGE AND WATER SUPPLY.

## (1). Water Closets.

- LEAMINGTON, 1877. BOSTEL, D. T., *Duke Street, Brighton*, for Excelsior Water Closet.

## (2). Dry Closets.

- LEAMINGTON, 1877. HARESCOUGH, B. B. & Co., *Bentinck Street, Leeds*, for Excreta Pail (oak) with Spring Lid.
- EXETER, 1880. MOSER, L., *Southampton*, for Dry Closet, suitable for Ashes or Disinfecting Powder.
- STAFFORD, 1878. MOULE'S PATENT EARTH CLOSET COMPANY, *5a, Garrick Street, W.C.*, for their Earth Closets.
- LEAMINGTON, 1877. PARKER, J., *Woodstock, Oxford*, for Dry Earth Closet.
- STAFFORD, 1878. SANITARY APPLIANCE COMPANY, *Salford*, for Sifting Ash Closet, with Soil Pail.

## (3). Urinals.

## (4). Sewage Treatment.

## (5). Traps.

## (6). Sinks.

No awards.

## (7). Baths and Lavatories.

- LEAMINGTON, 1877. GALBRAITH, T., *Crawford Square, Londonderry*, for Hot-Air Bath.
- CROYDON, 1879. LASCELLES, W., *Bunhill Row, E.C.*, for Concrete Bath in one piece.
- EXETER, 1880. TYLOR & SONS, *Newgate Street, E.C.*, for Flushing Rim Lavatory Basin and Apparatus.

## (8). Apparatus for Water Supply.

- CROYDON, 1879. DOULTON & Co., *Lambeth, London*, for Anti-Per-cussion High Pressure Valves.
- LEAMINGTON, 1877. LE GRAND & SUTCLIFFE, *Bunhill Row, E.C.*, for Improvements in Well Sinking Apparatus.

## (9). Cisterns.

## (10). Flushing and Watering.

No awards.

## (11). Miscellaneous Sanitary Goods.

- EXETER, 1880. BEAN, A. T., *5, Cannon Row, S.W.*, for Direct Acting Valveless Waste Preventer.
- STAFFORD, 1878. DOULTON & Co., *Lambeth, London*, for Stanford's Patent Joints for Stoneware Pipes.

## CLASS III.—HEATING, LIGHTING, AND VENTILATION.

## (1). Heating Apparatus.

- EXETER, 1880. DOULTON & Co., *Lambeth, London*, for Ventilating Tile Stove.
- EXETER, 1880. SANITARY & ECONOMIC SUPPLY ASSOCIATION, *Gloucester*, for Dr. Bond's Euthermic Gas Stove.

## (2). Cooking Apparatus.

- STAFFORD, 1878. BILLING & Co., *Hatton Garden, E.C.*, for Apparatus for Cooking by Gas.
- LEAMINGTON, 1877. HARRIS, G. H., *Bristol Street, Birmingham*, for Economical Cooking Range.
- STAFFORD, 1878. HASSALL & SINGLETON, *Birmingham*, for Phoenix Portable Range, and the Birmingham Range with Reducible Fire without Gas.
- STAFFORD, 1878. LEONI, S. & Co., *Strand*, for Apparatus for Cooking by Gas.
- CROYDON, 1879. WENHAM, W. P., *Church Street, Croydon*, for an Improved Open or Close Range Kitchener.
- EXETER, 1880. WILSON ENGINEERING COMPANY, *Holborn, W.C.*, for Wilson Portable Close Cooking Range.

## (3). Lighting.

- CROYDON, 1879. HAMILTON & Co., *Leadenhall Street, E.C.*, for Patent Prismoidal Pavement and Floor Lights

## (4). Ventilation.

- STAFFORD, 1878. ELLISON, J. E., *Leeds*, for Conical Ventilators.
- EXETER, 1880. HUNT, NATHAN, *Bristol*, for Auto-Pneumatic Ventilation.
- EXETER, 1880. MOORE, J., *St. James' Walk, Clerkenwell, E.C.*, for Glass Louvre Ventilators.
- STAFFORD, 1878. PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Economic Hollow Flooring.

## CLASS IV. — PERSONAL HYGIENE FOODS, AND DISINFECTANTS.

## (1). Clothing.

No awards.

## (2). Beds, &amp;c.

- LEAMINGTON, 1877. CHORLTON & DUGDALE, *Manchester*, for Excelsior Spring Mattress.
- STAFFORD, 1878. POCOCK BROS., *Southwark Bridge Road*, for Universal Invalid Tubular Water and Air Bed.



**(3). Educational Appliances.**

- EXETER, 1880. COLMAN & GLENDENNING, *Norwich*, for School Furniture.

**(4). Domestic Appliances.**

- EXETER, 1880. CARTER, J., 6a, *Cavendish Street, W.*, for Invalid Furniture.
- LEAMINGTON, 1877. HANCOCK, F. & C., *Dudley, Worcester*, for Machine for Washing and Cooling Butter.
- CROYDON, 1879. READ, JEFFERSON, *Birmingham*, for Arcanum Process of Silver Plating Steel.

**(5). Foods.**

• No awards.

**(6). Filters and Arrangements for Softening Water.**

- CROYDON, 1879. MAIGNEN, P. A., *Great Tower Street, E.C.*, for Filtre Rapide.
- LEAMINGTON, 1877. SPONGY IRON WATER PURIFYING COMPANY, *Oxford Street, W.C.*, for Bischof's Spongy Iron Filter.

**(7). Mineral Waters.**

• No awards.

**(8). Disinfectants.**

- LEAMINGTON, 1877. CALVERT & Co., *Bradford, Manchester*, for Calvert's Carbolic Acid for disinfecting purposes.
- STAFFORD, 1878. MORRIS, LITTLE & Co., *Doncaster*, for Little's Soluble Phenyle.
- LEAMINGTON, 1877. SOCIÉTÉ FRANÇAISE D'HYGIÈNE, *Paris*, for Chemical Preparations and Apparatus.

**(9). Disinfecting Apparatus.**

- CROYDON, 1879. FRASER BROS., *Commercial Road, E.*, for Portable Disinfecting Apparatus.
- CROYDON, 1879. WALKER, CHAS. W., *Wandsworth Common*, for Acid Pump and Syphon.

**CLASS V.—MISCELLANEOUS.**

Articles of Sanitary Interest not included in the above Classes, such as :—

• (1). Scientific Instruments.

• (2). Books on Sanitation.

• (3). Prevention of Accidents.

• (4). Methods for the Disposal of the Dead.

• No awards.

**(5). Sundries.**

- STAFFORD, 1878. DUNCAN, Maj. F., *The Common, Woolwich*, for Ambulance Wheeled Litter.
- CROYDON, 1879. SINCLAIR, J., *Leadenhall Street, E.C.*, for Tyn-dall's Smoke Respirator.

## CERTIFICATES AWARDED AT THE EXHIBITIONS.

\* Medal Awarded at a Previous Exhibition.

### CLASS I.—CONSTRUCTION AND MACHINERY.

#### (1). Construction and Materials.

- CROYDON, 1879. ADAMS, R., 7, *Great Dover Street, S.E.*, for Adjustable Shoe, and Regulating Spring Hinge for Swinging Doors.
- CROYDON. 1879. ADAMS, R., 7, *Great Dover Street, S.E.*, for Fan-light Openers and Casement Fasteners.
- EXETER, 1880. CANDY & Co., *Newton Abbot*, for Granite Vitrified Bricks and Paving.
- CROYDON, 1879. \*PRITCHETT, G. E., F.S.A., 20, *Spring Gardens, S.W.*, for Improvements in Hollow Tile Flooring.
- EXETER, 1880. \*SALMON, BARNES & Co., *Ulverston*, for Revolving Shutters with Patent Balance Weight Motion.

#### (2). Paints and other Protectives.

##### (3). Wall Papers.

No awards.

##### (4). Decorative Materials.

- CROYDON, 1879. DOULTON & Co., *Lambeth, London*, for Decorative Tiles for Covering Walls and Floors.

#### (5). Machinery adapted for Sanitary Purposes.

- EXETER, 1880. MCCALLUM, J. B., *Stafford*, for Improved Non-Absorbent Tub or Pail Van.

#### (6). Washing Machines.

- STAFFORD, 1878. \*BRADFORD, THOMAS, & Co., *Salford*, for Shuttle Steam-Power Washing Machine.
- EXETER, 1880. GARTON & KING, *Exeter*, for Vowel E. Bradford's Family Washing Machine.

### CLASS II.—SEWERAGE AND WATER SUPPLY.

#### (1). Water Closets.

- CROYDON, 1879. BEARD, DENT & HELLYER, 21, *Newcastle Street, W.C.*, for Artizan Closet.
- STAFFORD, 1878. \*BOSTEL, D. T., *Duke Street, Brighton*, for "Excelsior" Water Closet.
- EXETER, 1880. DOULTON & Co., *Lambeth, London*, for an Economical Flush-Out Closet.
- EXETER, 1880. TYLOR, J., & SONS, 2, *Newgate Street, E.C.*, for "Clear Way" Regulator Valve Water Closet, without overflow communicating with Valve Box.

## (2). Dry Closets.

- EXETER, 1880. BRITISH SANITARY COMPANY, *Glasgow*, for Self-Acting Earth Closet.
- STAFFORD, 1878. \*HARESCUEGH, B. B. & Co., *Leeds*, for Excreta Pail (oak) with Patent Spring Lid.
- CROYDON, 1879. \*MOULE'S PATENT EARTH CLOSET COMPANY (LIMITED), *5a, Garrick Street, W.C.*, for Earth Closet.
- CROYDON, 1879. ONIONS, J. C., (LIMITED), *Birmingham*, for Moser's Patent Self-Acting Dry Closet.
- EXETER, 1880. PARKER, J., *Woodstock*, for Dry Earth Commode without Separator.
- CROYDON, 1879. \*SANITARY APPLIANCE COMPANY, *Factory Lane, Salford*, for Patent Cinder-Sifting Ash Closet.
- EXETER, 1880. \*WIPPELL BROS. & ROW, 231 and 232, *High Street, Exeter*, for Moule's Earth Closet.

## (3). Urinals.

No awards.

## (4). Sewage Treatment.

- STAFFORD, 1878. SHONE, ISAAC, *Wrexham*, for Pneumatic Liquid Ejector.

## (5). Traps.

- CROYDON, 1879. BEARD, DENT & HELLYER, 21, *Newcastle Street, W.C.*, for Patent Ventilating Drain Syphon.
- EXETER, 1880. CRAIG, J. & M., *Kilmarnock*, for Buchan's Patent Trap.
- CROYDON, 1879. DOULTON & Co., *Lambeth, London*, for Disconnecting Gully, with back and side Entrances and iron grating.
- CROYDON, 1879. EDWARDS, J. C., *Trefynant Ruabon*, for Dean's Patent External Drain Traps, with movable receptacle.
- CROYDON, 1879. HAMMOND & HUSSEY, *High Street, Croydon*, for Hornibrook's Patent Catchment Grating for Steep Gradients.
- CROYDON, 1879. HYGIENIC STOVE AND GRATE COMPANY, 15, *Peel Buildings, Birmingham*, for "Eagle" Sanitary Trap, for superseding Bell Traps.
- STAFFORD, 1878. POTTS & Co., *Handsworth, Birmingham*, for the Edinburgh Air-Chambered Sewer Trap.
- STAFFORD, 1878. STIFF, JAMES, & SONS, *Lambeth, London*, for Weaver's Ventilating Sewer Air Trap.

## (6). Sinks.

- CROYDON, 1879. JENNINGS, G., *Stangate, London*, for "Artizans' Dwellings Sink."
- CROYDON, 1879. STIDDER & Co., 50, *Southwark Bridge Road, S.E.*, for Swivel, Lock Plug, and Overflow for Sinks.

- EXETER, 1880. TYLOR, J. & SONS, 2, *Newgate Street, E.C.*, for Improved Enamelled Iron Slop Sink, with Patent Regulator Supply Valve.
- CROYDON, 1879. WILLCOCK & CO., *Burmantofts, Leeds*, for Fire-Clay Sanitary Sinks, and Water Troughs.

(7). Baths and Lavatories.

- STAFFORD, 1878. GILLOW & CO., *Oxford Street, W.*, for Lavatory.
- CROYDON, 1879. JENNINGS, G., *Stangate, London*, for "Universal" Shampooing Apparatus.
- EXETER, 1880. \*LASCELLES, W., 121, *Bunhill Row, London*, for Concrete Bath, in one piece.
- ✓ STAFFORD, 1878. RUFFARD & CO., *Clay Works, Stourbridge*, for Porcelain Baths, moulded and glazed in one piece.

(8). Apparatus for Water Supply.

- CROYDON, 1879. BRAITHWAITE & CO., *Leeds*, for Patent Syphon for Water Closet Cisterns.
- EXETER, 1880. \*DOULTON & CO., *Lambeth, London*, for Antipercussion High Pressure Draw-off Valves.
- CROYDON, 1879. FINCH & CO., 181, *High Holborn, W.C.*, for large Way Waste Plug, with Protective Cover.
- CROYDON, 1879. HEADLEY & SONS, *Cambridge*, for Patent Hose Reel.
- CROYDON, 1879. \*LE GRAND & SUTCLIFFE, 100, *Bunhill Row, London*, for Improvements in Internal driving of Tube Wells.
- EXETER, 1880. TYLOR, J. & SONS, 2, *Newgate Street, E.C.*, for Improved Full-Way Stop Valve.
- EXETER, 1880. TYLOR, J. & SONS, 2, *Newgate Street, E.C.*, for "Waste Not" Regulator Valve.

(9). Cisterns.

(10). Flushing and Watering.

No awards.

(11). Miscellaneous Sanitary Goods.

- EXETER, 1880. BRANKSEA ISLAND POTTERY COMPANY (LIMITED), *Poole, Dorset*, for Stoneware Pipes
- EXETER, 1880. \*DOULTON & CO., *Lambeth, London*, for Stanford's Patent Joints for Stoneware Pipes.
- STAFFORD, 1878. OATES & GREEN, *Horley Green Fire Clay Works, Halifax*, for Patent Drain-cleaning Rods and Stoneware Horse Manger.
- CROYDON, 1879. PATENT VICTORIA STONE COMPANY, *Kingsland Road, E.*, for Artificial Stone Tubes.
- CROYDON, 1879. SHARP, JONES & CO., *Bourne Valley Pottery, Poole, Dorset*, for Rock Concrete Tubes.
- EXETER, 1880. WIPPELL BROS. & ROW, 231 and 232, *High Street, Exeter*, for Ransome's Artificial Stone Air Brick.



## CLASS III.—HEATING, LIGHTING AND VENTILATION.

## (1). Heating Apparatus.

- STAFFORD, 1878. PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Warming and Ventilating Appliances.
- EXETER, 1880. PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Corrugated Iron Hot-Water Warming Appliances.
- STAFFORD, 1878. SNELL, H. SAXON, *Southampton Buildings*, for the Thermhydic Ventilating Hot-water Open Fire Grate.
- EXETER, 1880. WIPPELL BROS. & ROW, *Exeter*, for Conservatory Boiler, with Hot-Water Pipe.

## (2). Cooking Apparatus.

- CROYDON, 1879. \*BILLING & Co., *Hatton Garden, E.C.*, for the "Workman's" Cooking Stove, and other Improvements in Gas-Cooking Stoves.
- EXETER, 1880. CHORLTON & DUGDALE, 19, *Blackfriars Street, Manchester*, for "Sunlight Stove."
- EXETER, 1880. CONSTANTINE, T. J., *Fleet Street, E.C.*, for the Devonshire Cooking Range.
- STAFFORD, 1878. \*HARRIS, G. H., *Bristol Street, Birmingham*, for Economical Cooking Range.
- CROYDON, 1879. LEWIS, MRS. A., *Manchester*, for Tin Cooking Utensils.
- CROYDON, 1879. WALLER, THOS., 47, *Fish Street Hill, E.C.*, for Cooking Stove with Warm-Air Chamber,
- EXETER, 1880. WIPPELL BROS. & ROW, 231 and 232, *High Street, Exeter*, for Cottage Range.

## (3). Lighting.

- CROYDON, 1879. BRAY & Co., *Blackman Lane, Leeds*, for Improved Gas Burners.
- CROYDON, 1879. CLARKE, F. W., PORTABLE GAS APPARATUS COMPANY (LIMITED), *Great Queen Street, W.C.*, for Patent Portable Gas Apparatus for Manufacturing Gas from Gasoline.
- STAFFORD, 1878. LEONI, S. & Co., *Strand, W.C.*, for the "Rheometer" Street Lamp Regulator.
- CROYDON, 1879. RANSOME, S. E., & Co., 10, *Essex Street, W.C.*, for "Milwaukee" Glass Lantern or Hurricane Lantern.
- EXETER, 1880. WILLEY & Co., *Exeter*, for their Exhibit of Gaseliers and Gas Brackets.
- EXETER, 1880. WIPPELL BROS. & ROW, 231, *High Street, Exeter*, for Chappiuss Daylight Reflector.

## (4). Ventilation.

- CROYDON, 1879. BIRD, PETER HINCKES, 1, *Norfolk Square, W.*, for his Method of Costless Ventilation.

- CROYDON, 1879. \*ELLISON, J. E., *Victoria Square, Leeds*, for Conical Ventilators.
- CROYDON, 1879. KNELL, U., 77, *Fore Street, E.C.*, for "Imperial" Ventilating Window.
- EXETER, 1880. SHARP, C. H. & Co., *High Holborn, E.C.*, for Ornamental Inlet Ventilators.
- CROYDON, 1879. WENHAM & Co., *Church Street, Croydon*, for Boyle's Mica-Valved Outlet Ventilator.

#### CLASS IV.—PERSONAL HYGIENE, FOODS, AND DISINFECTANTS.

##### (1.) Clothing.

- STAFFORD, 1878. BARTRUM, HARVEY & Co., *London*, for Patent Ventilatorium Waterproof Garments.

##### (2.) Beds, &c.

- STAFFORD, 1878. ALLEN, THOMAS, *St. Augustine's Parade, Bristol*, for Metallic Tubular Bedsteads and Invalid Bedrests.
- CROYDON, 1879. BALL, ANCELL, *Spalding*, for Folding Invalid Bed.
- EXETER, 1880. BROCK, WILLIAM & Co., 177, *Fore Street, Exeter*, for Bed Rest with Movable Arms.
- EXETER, 1880. BROCK, WILLIAM, & Co., 177, *Fore Street, Exeter*, for "Nonsuch" Adjustable Chair.
- CROYDON, 1879. BUSSEY & Co., *Museum Works, Peckham, S.E.*, for Patent Spring Mattress.
- STAFFORD, 1878. \*CHORLTON & DUGDALE, *Manchester*, for "Excelsior" Spring Mattress.
- CROYDON, 1879. \*CHORLTON & DUGDALE, *Manchester*, for "Excelsior" Spring Mattress Hospital Bed.
- EXETER, 1880. CHORLTON & DUGDALE, *Manchester*, for "Invalids'" Adjustable Bed.
- EXETER, 1880. \*CHORLTON & DUGDALE, *Manchester*, for "Excelsior" Spring Mattress.
- EXETER, 1880. COLMAN & GLENDENNING, *Norwich*, for Patent Automaton Seat for Drapers.
- STAFFORD, 1878. HAMILTON, W., *Brighton*, for Invalid "Grasshopper" Couch.
- CROYDON, 1879. \*POCOCK BROS., *Southwark Bridge Road, S.E.*, for "Universal" Tubular Air and Water Bed.
- EXETER, 1880. WIPPELL BROS. & Row, *Exeter*, for Fernby's "Paragon" Camp Furniture.

##### (3.) Educational Appliances.

- STAFFORD, 1878. COLMAN & GLENDENNING, *Norwich*, for School Desks with Shifting Seats.
- STAFFORD, 1878. LARMOUTH, THOMAS, & Co., *Salford*, for Dual Desk, with Separate Gangway Seat.

## (4). Domestic Appliances.

- STAFFORD, 1878. COMPOSTELLA FIRE LIGHT COMPANY, *Fenchurch Street, E.C.*, for the Compostella Fire Lights for Lighting Fires.
- STAFFORD, 1878. \*HANCOCK, F. & C., *Dudley, Worcester*, for Machine for Washing and Cooling Butter.
- EXETER, 1880. HANCOCK, F. & C., *Dudley, Worcester*, for Dough Kneading Machine.
- EXETER, 1880. HANCOCK, F. & C., *Dudley, Worcester*, for New Propellor Churn.
- STAFFORD, 1878. HILTON, W. H., *Leamington*, for Various Inventions for Promoting Domestic Economy.
- EXETER, 1880. HUTCHINSON, A. & Co., *Great Winchester Street, E.C.*, for India Rubber Gas Tubing.
- EXETER, 1880. WIPPEL BROS. & Row, *High Street, Exeter*, for Improved Housemaid's Box with Sifter.

## (5). Foods.

- EXETER, 1880. FRY, J. S., & SONS, *Union Street, Bristol*, for Cocoa Extract and Preparations of Chocolate.

## (6). Filters and Arrangements for Softening Water.

- EXETER, 1880. MAIGNEN, P. A., 20 & 23, *Great Tower Street, E.C.*, for "Bijou" Filtre Rapide.
- EXETER, 1880. \*MAIGNEN, P. A., 20 & 23, *Great Tower Street, E.C.*, for Filtre Rapide.
- EXETER, 1880. SILICATED CARBON FILTER COMPANY, *Battersea*, for Silicated Carbon Double Chambered Table Filters.
- EXETER, 1880. STEPHAN, J. A., *Worcester*, for Carbonised Iron Stone Mound Filter for Water.
- STAFFORD, 1878. THORN & Co., *Stafford*, for Artificial Stone Filters, for Cleansing Rain Water for Domestic Use.

## (7). Mineral Waters.

- EXETER, 1880. CARTER & Co., *Old Refinery, Bristol*, for Preparations of Lime Juice, Aromatic Ginger Ale, and Quinine Tonic.
- CROYDON, 1879. EVANS & Co., *Wrexham*, for Zoedone. (Patentee David Johnson, F.C.S.)
- CROYDON, 1879. GULLIVER & Co., *Aylesbury*, for Lemonade, Lime Juice, and Ginger Ale.
- STAFFORD, 1878. JEWSBURY & BROWN, *Manchester*, for Seltzer Water.
- CROYDON, 1879. NEWRY MINERAL WATER COMPANY (LIMITED), *Liverpool* for Ginger Ale and Lemonade.
- EXETER, 1880. SKINNER, G. H., 13, *North Street, Exeter*, for Seltzer, Soda, and Potash Waters, and Orange Quinine Tonic.

## (8). Disinfectants.

- CROYDON, 1879. CALVERT, F. C. & Co., *Bradford*, for Carbolic Acid.  
 EXETER, 1880. CALVERT, F. C. & Co., *Bradford*, for Carbolic Acid and preparations of it.  
 CROYDON, 1879. JEYES' SANITARY COMPOUND COMPANY, *Bishopsgate Street, E.C.*, for Jeyes' Perfect Purifier.

## (9) Disinfecting Apparatus.

- EXETER, 1880. CALVERT, F. C., & Co., *Bradford*, for Improved Vaporiser for Disinfecting.

## CLASS V.—MISCELLANEOUS.

Articles of Sanitary Interest not included in the above Classes, such as :—

## (1). Scientific Instruments.

- EXETER, 1880. BIRD, P. HINCKES, 1, *Norfolk Square, N.W.*, for Large Legible Spirit Thermometer.  
 STAFFORD, 1878. PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Thermometrical Instruments.  
 CROYDON, 1879. PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Barometrical and Thermometrical Instruments.  
 EXETER, 1880. PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Improvements in Thermometrical and Barometrical Instruments.  
 CROYDON, 1879. WEBSTER & Co., *Nottingham*, for Webster's Patent Photometer.

## (2). Books on Sanitation.

- STAFFORD, 1878. LADIES' SANITARY ASSOCIATION, *Berners Street, W.*, for their Publications.

## (3). Prevention of Accidents.

- CROYDON, 1879. SELIG, SONNENTHAL & Co. (Limited), *Lambeth Hill, Queen Victoria Street, E.C.*, for Patent Safety Belt Shippers.  
 CROYDON, 1879. SINCLAIR, J., 104, *Leadenhall Street, E.C.*, for Chemical Fire Exterminator.

## (4). Methods for the Disposal of the Dead.

- STAFFORD, 1878. LONDON NECROPOLIS COMPANY, *Strand, W.C.*, for Patent "Earth to Earth" Coffins.  
 CROYDON, 1879. STRETTON, S., *Kidderminster*, for a Folding Bier and Car for Simplifying Funerals.



# ALPHABETICAL LIST OF MEDALS AWARDED AT THE EXHIBITIONS.

## RICHARDSON MEDAL.

- SILICATE PAINT COMPANY, *Cannon Street, E.C.*, STAFFORD, 1878.  
for Griffiths' Patent White.

## SILVER MEDAL.

Offered by the Exeter Gas Company.

- SANITARY AND ECONOMIC SUPPLY ASSOCIATION for EXETER, 1880.  
Dr. Bond's Euthermic Ventilating Gas Stove.
- AVELING & PORTER, *Rochester*, for Improved CROYDON, 1879.  
Six-Ton Steam Road Roller.
- BEAN, A. T., 5, *Cannon Row, S.W.*, for Direct EXETER, 1880.  
Acting Valveless Waste Preventer.
- BILLING & Co., *Hatton Garden, E.C.*, for Appa- STAFFORD, 1878.  
ratus for Cooking by Gas.
- BORWELL, J., *Britannia Foundry, Burton-on- LEAMINGTON, 1877.  
Trent*, for Improved Washer, with table com-  
plete.
- BOSTEL, D. T., *Duke Street, Brighton*, for Excel- LEAMINGTON, 1877.  
sior Water Closet.
- BRADFORD, T. & Co., *High Holborn, W.C.*, for LEAMINGTON, 1877.  
New Patent "Shuttle" Steam Power Washing  
Machine.
- CALVERT & Co., *Bradford, Manchester*, for Cal- LEAMINGTON, 1877.  
vert's Carbolic Acid for disinfecting purposes.
- CARTER, J., 6a, *Cavendish Street, W.*, for Invalid EXETER, 1880.  
Furniture.
- CHORLTON & DUGDALE, *Manchester*, for Excelsior LEAMINGTON, 1877.  
Spring Mattress.
- COLMAN & GLENDENNING, *Norwich*, for School EXETER, 1880.  
Furniture.
- DOULTON & Co., *Lambeth, London*, for Stanford's STAFFORD, 1878.  
Patent Joints for Stoneware Pipes.
- DOULTON & Co., *Lambeth, London*, for Anti-Per- CROYDON, 1879.  
cussion High Pressure Valves.
- DOULTON & Co., *Lambeth, London*, for Ventilating EXETER, 1880.  
Tile Stove.

- DUNCAN, Maj. F., *The Common, Woolwich*, for STAFFORD, 1878.  
Ambulance Wheeled Litter.
- ELLISON, J. E., *Leeds*, for Conical Ventilators. STAFFORD, 1878.
- FRASER BROS., *Commercial Road, E.*, for Port- CROYDON, 1879.  
able Disinfecting Apparatus.
- GALBRAITH, T., *Crawford Square, Londonderry*, LEAMINGTON, 1877.  
for Hot-Air Bath.
- HAMILTON & Co., *Leadenhall Street, E.C.*, for CROYDON, 1879.  
Patent Prismoidal Pavement and Floor  
Lights.
- HANCOCK, F. & C., *Dudley, Worcester*, for Machine LEAMINGTON, 1877.  
for Washing and Cooling Butter.
- HARESCUEGH, B. B. & Co., *Bentinck Street, Leeds*, LEAMINGTON, 1877.  
for Excreta Pail (oak) with Spring Lid.
- HARRIS, G. H., *Bristol Street, Birmingham*, for LEAMINGTON, 1877.  
Economical Cooking Range.
- HASSALL & SINGLETON, *Birmingham*, for Phoenix STAFFORD, 1878.  
Portable Range, and the Birmingham Range  
with Reducible Fire without Gas.
- HUNT, NATHAN, *Bristol*, for Auto-Pneumatic EXETER, 1880.  
Ventilation.
- LASCELLES, W., *Bunhill Row, E.C.* for Concrete CROYDON, 1879.  
Bath in one piece.
- LE GRAND & SUTCLIFFE, *Bunhill Row, E.C.*, for LEAMINGTON, 1877.  
Improvements in Well Sinking Apparatus.
- LEONI, S. & Co., *Strand*, for Apparatus for Cook- STAFFORD, 1878.  
ing by Gas.
- MAIGNEN, P. A., *Great Tower Street, E.C.*, for CROYDON, 1879.  
Filtre Rapide.
- MOORE, J., *St. James' Walk, Clerkenwell, E.C.*, EXETER, 1880.  
for Glass Louvre Ventilators.
- MORRIS, LITTLE & Co., *Doncaster*, for Little's STAFFORD, 1878.  
Soluble Phenyle.
- MOSER, L., *Southampton*, for Dry Closet, suitable EXETER, 1880.  
for Ashes or Disinfecting Powder.
- MOULE'S PATENT EARTH CLOSET COMPANY, 5a, STAFFORD, 1878.  
*Garrick Street, W.C.*, for their Earth Closets.
- PARKER, J., *Woodstock, Oxford*, for Dry Earth LEAMINGTON, 1877.  
Closet.
- POCKOCK, BROS., *Southwark Bridge Road*, for Uni- STAFFORD, 1878.  
versal Invalid Tubular Water and Air Bed.
- PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for STAFFORD, 1878.  
Economic Hollow Flooring.
- READ, JEFFERSON, *Birmingham*, for Arcanum CROYDON, 1879.  
Process of Silver Plating Steel.
- SANITARY APPLIANCE COMPANY, *Salford*, for STAFFORD, 1878.  
Sifting Ash Closet, with Soil Pail.
- SANITARY & ECONOMIC SUPPLY ASSOCIATION, EXETER, 1880.  
*Gloucester*, for Dr. Bond's Euthermic Gas  
Stove.

- SILICATE PAINT COMPANY, *Cannon Street, E.C.*, STAFFORD, 1878.  
for Griffiths' Patent White, and for their preparations of Silicate Paint, Enamel Paint, and Petrifying Liquids.
  - SINCLAIR, J., *Leadenhall Street, E.C.*, for Tyn- CROYDON, 1879.  
dall's Smoke Respirator.
  - SOCIÉTÉ FRANÇAISE D'HYGIÈNE, *Paris*, for Chemi- LEAMINGTON, 1877.  
cal Preparations and Apparatus.
  - SPONGY IRON WATER PURIFYING COMPANY, LEAMINGTON, 1877.  
*Oxford Street, W.C.*, for Bischof's Spongy Iron Filter.
  - TYLOR & SONS, *Newgate Street, E.C.*, for Flushing EXETER, 1880.  
Rim Lavatory Basin and Apparatus.
  - WALKER, CHAS. W., *Wandsworth Common*, for CROYDON, 1879.  
Acid Pump and Syphon.
  - WEBB, H. CHALK, *Worcester*, for Colouring Pat- EXETER, 1880.  
terns through the Substance of Wood.
  - WENHAM, W. P., *Church Street, Croydon*, for an CROYDON, 1879.  
Improved Open or Close Range Kitchener.
  - WILLCOCKS & Co., *Burmantofts, Leeds*, for CROYDON, 1879.  
Silica Glazed and Enamelled Fire Clay Bricks and Faience.
  - WILSON ENGINEERING COMPANY, *Holborn, W.C.*, EXETER, 1880.  
for Wilson Portable Close Cooking Range.
  - WOOLAMS & Co., *High Street Marylebone*, for CROYDON, 1879.  
Paper Hangings free from Arsenic.
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## ALPHABETICAL LIST OF CERTIFICATES AWARDED AT THE EXHIBITIONS.

\* Medal Awarded at a Previous Exhibition.

• ADAMS, R., 7, <i>Great Dover Street, S.E.</i> , for Adjustable Shoe, and Regulating Spring Hinge for Swinging Doors.	CROYDON,	1879.
• ADAMS, R., 7, <i>Great Dover Street, S.E.</i> , for Fanlight Openers and Casement Fasteners.	CROYDON,	1879.
• ALLEN, THOMAS, <i>St. Augustine's Parade, Bristol</i> , for Metallic Tubular Bedsteads and Invalid Bedrests.	STAFFORD,	1878.
• BALL, ANCELL, <i>Spalding</i> , for Folding Invalid Bed.	CROYDON,	1879.
• BARTRUM, HARVEY, & Co., <i>London</i> , for Patent Ventilatorium Waterproof Garments.	STAFFORD,	1878.
• BEARD, DENT, & HELLYER, 21, <i>Newcastle Street, W.C.</i> , for Artizan Closet.	CROYDON,	1879.
• BEARD, DENT, & HELLYER, 21, <i>Newcastle Street, W.C.</i> , for Patent Ventilating Drain Syphon.	CROYDON,	1879.
• BIRD, PETER HINCKES, 1, <i>Norfolk Square, N.W.</i> , for his Method of Costless Ventilation.	CROYDON,	1879.
• BIRD, PETER HINCKES, 1, <i>Norfolk Square, N.W.</i> , for Large Legible Spirit Thermometer.	EXETER,	1880.
• *BILLING & Co., <i>Hatton Garden, E.C.</i> , for the "Workman's" Cooking Stove, and other Improvements in Gas-Cooking Stoves.	CROYDON,	1879.
• *BOSTEL, D. T., <i>Duke Street, Brighton</i> , for "Ex-celsior" Water Closet.	STAFFORD,	1878.
• *BRADFORD, THOMAS & Co., <i>Salford</i> , for Shuttle Steam-Power Washing Machine.	STAFFORD,	1878.
• BRAITHWAITE & Co., <i>Leeds</i> , for Patent Syphon for Water Closet Cisterns.	CROYDON,	1879.
• BRANKSEA ISLAND POTTERY COMPANY (LIMITED) <i>Pool, Dorset</i> , for Stoneware Pipes.	EXETER,	1880.
• BRITISH SANITARY COMPANY, <i>Glasgow</i> , for Self-Acting Earth Closet	EXETER,	1880.
• BROCK, WILLIAM, & Co., 177, <i>Fore Street, Exeter</i> , for Bed Rest with Movable Arms.	EXETER,	1880.
• BROCK, WILLIAM, & Co., 177, <i>Fore Street, Exeter</i> , for "Nonsuch" Adjustable Chair.	EXETER,	1880.
• BRAY & Co., <i>Blackman Lane, Leeds</i> , for Improved Gas Burners.	CROYDON,	1879.



- BUSSEY & Co., *Museum Works, Peckham, S.E.*, CROYDON, 1879.  
for Patent Spring Mattress.
- CALVERT, F. C., & Co., *Bradford*, for Carbolic CROYDON, 1879.  
Acid.
- CALVERT, F. C., & Co., *Bradford*, for Carbolic EXETER, 1880.  
Acid and preparations of it.
- CALVERT, F. C., & Co., *Bradford*, for Improved EXETER, 1880.  
Vaporiser for Disinfecting.
- CANDY & Co., *Newton Abbot*, for Granite Vitri- EXETER, 1880.  
fied Bricks and Paving.
- CARTER & Co., *Old Refinery, Bristol*, for Prepa- EXETER, 1880.  
rations of Lime Juice, Aromatic Ginger Ale,  
and Quinine Tonic.
- \*CHORLTON & DUGDALE, *Manchester*, for "Excel- STAFFORD, 1878.  
sior" Spring Mattress.
- \*CHORLTON & DUGDALE, *Manchester*, for "Excel- CROYDON, 1879.  
sior" Spring Mattress Hospital Bed.
- CHORLTON & DUGDALE, *Manchester*, for "Sun- EXETER, 1880.  
light Stove."
- CHORLTON & DUGDALE, *Manchester*, for "Inva- EXETER, 1880.  
lids'" Adjustable Bed.
- \*CHORLTON & DUGDALE, *Manchester*, for "Excel- EXETER, 1880.  
sior" Spring Mattress.
- CLARKE, F. W., PORTABLE GAS APPARATUS COM- CROYDON, 1879.  
PANY (LIMITED), *Great Queen Street, W.C.*  
for Patent Portable Gas Apparatus for  
Manufacturing Gas from Gasoline.
- COLMAN & GLENDENNING, *Norwich*, for School STAFFORD, 1878.  
Desks with Shifting Seats.
- COLMAN & GLENDENNING, *Norwich*, for Patent EXETER, 1880.  
Automaton Seat for Drapers.
- COMPOSTELLA FIRE-LIGHT COMPANY, *Fen- STAFFORD, 1878.  
church Street, E.C.*, for the Compostella Fire  
Lights for Lighting Fires.
- CONSTANTINE, T. J., *Fleet Street, E.C.*, for the EXETER, 1880.  
Devonshire Cooking Range
- CRAIG, J. & M., *Kilmarnock*, for Buchan's Patent EXETER, 1880.  
Trap.
- DOULTON & Co., *Lambeth, London*, for De- CROYDON, 1879.  
corative Tiles for Covering Walls and  
Floors.
- DOULTON & Co., *Lambeth, London*, for Discon- CROYDON, 1879.  
necting Gully, with back and side Entrances  
and iron grating.
- DOULTON & Co., *Lambeth, London*, for an Eco- EXETER, 1880.  
nomical Flush-Out Closet.
- \*DOULTON & Co., *Lambeth, London*, for Anti- EXETER, 1880.  
percussion High Pressure Draw-off Valves.
- \*DOULTON & Co., *Lambeth, London*, for Stan- EXETER, 1880.  
ford's Patent Joints for Stoneware Pipes.

- EDWARDS, J. C., *Trefynant, Ruabon*, for Dean's Patent External Drain Traps, with movable receptacle. CROYDON, 1879.
- \*ELLISON, J. E., *Victoria Square, Leeds*, for Conical Ventilators. CROYDON, 1879.
- EVANS & Co., *Wrexham*, for Zoedone. (Patentee David Johnson, F.C.S.) CROYDON, 1879.
- FINCH & Co., 181, *High Holborn, W.C.*, for large Way Waste Plug, with Protective Cover. CROYDON, 1879.
- FRY, J. S., & SONS, *Union Street, Bristol*, for Cocoa Extract and Preparations of Chocolate. EXETER, 1880.
- GARTON & KING, *Exeter*, for Vowel E. Bradford's Family Washing Machine. EXETER, 1880.
- GILLOW & Co., *Oxford Street, W.*, for Lavatory. STAFFORD, 1878.
- GULLIVER & Co., *Aylesbury*, for Lemonade, Lime Juice, and Ginger Ale. CROYDON, 1879.
- HAMILTON, W., *Brighton*, for Invalid "Grass-hopper" Couch. STAFFORD, 1878.
- HAMMOND & HUSSEY, *High Street, Croydon*, for Hornibrook's Patent Catchment Grating for Steep Gradients. CROYDON, 1879.
- \*HANCOCK, F. & C., *Dudley, Worcester*, for Machine for Washing and Cooling Butter. STAFFORD, 1878.
- HANCOCK, F. & C., *Dudley, Worcester*, for New Propellor Churn. EXETER, 1880.
- HANCOCK, F. & C., *Dudley, Worcester*, for Dough Kneading Machine. EXETER, 1880.
- \*HARESCUEGH, B. B. & Co., *Leeds*, for Excreta Pail (oak) with Patent Spring Lid. STAFFORD, 1878.
- \*HARRIS, G. H., *Bristol Street, Birmingham*, for Economical Cooking Range. STAFFORD, 1878.
- HEADLEY & SONS, *Cambridge*, for Patent Hose Reel. CROYDON, 1879.
- HILTON, W. H., *Leamington*, for various Inventions for Promoting Domestic Economy. STAFFORD, 1878.
- HUTCHINSON, A. & Co., *Great Winchester Street, E.C.*, for India Rubber Gas Tubing. EXETER, 1880.
- HYGIENIC STOVE AND GRATE COMPANY, 15, *Peel Buildings, Birmingham*, for "Eagle" Sanitary Trap, for superseding Bell Traps. CROYDON, 1879.
- JENNINGS, G., *Stangate, London*, for "Artizans' Dwellings Sink." CROYDON, 1879.
- JENNINGS, G., *Stangate, London*, for Universal Shampooing Apparatus. CROYDON, 1879.
- JEWSBURY & BROWN, *Manchester*, for Seltzer Water. STAFFORD, 1878.
- JEVES' SANITARY COMPOUND COMPANY, *Bishopsgate Street, E.C.*, for Jeyes' Perfect Purifier. CROYDON, 1879.

- KNELL, U., 77, *Fore Street, E.C.*, for "Imperial" Ventilating Window. CROYDON, 1879.
- LADIES' SANITARY ASSOCIATION, *Berners Street, W.*, for their Publications. STAFFORD, 1878.
- LARMOUTH, THOMAS, & Co., *Salford*, for Dual Desk, with Separate Gangway Seat. STAFFORD, 1878.
- \*LASCELLES, W., 121, *Bunhill Row, London*, for Concrete Bath, in one piece. EXETER, 1880.
- \*LE GRAND & SUTCLIFFE, 100, *Bunhill Row, London*, for Improvements in Internal driving of Tube Wells. CROYDON, 1879.
- LEONI, S. & Co., *Strand, W.C.*, for the "Rheometer" Street Lamp Regulator. STAFFORD, 1878.
- LEWIS, MRS. A., *Manchester*, for Tin Cooking Utensils. CROYDON, 1879.
- LONDON NECROPOLIS COMPANY, *Strand, W.C.*, for Patent "Earth to Earth" Coffins. STAFFORD, 1878.
- MAIGNEN, P. A., 20 & 23, *Great Tower Street, E.C.*, for "Bijou" Filtre Rapide. EXETER, 1880.
- \*MAIGNEN, P.A., 20 & 23, *Great Tower Street, E.C.*, for Filtre Rapide. EXETER, 1880.
- MCCALLUM, J. B., *Stafford*, for Improved Non-Absorbent Tub or Pail Van. EXETER, 1880.
- \*MOULE'S PATENT EARTH CLOSET COMPANY (LIMITED), 5a, *Garrick Street, W.C.*, for Earth Closet. CROYDON, 1879.
- NEWRY MINERAL WATER COMPANY (LIMITED), *Liverpool*, for Ginger Ale and Lemonade. CROYDON, 1879.
- OATES & GREEN, *Horley Green Fire Clay Works, Halifax*, for Patent Drain-cleaning Rods and Stoneware Horse Manger. STAFFORD, 1878.
- ONIONS, J. C., (LIMITED), *Birmingham*, for Moser's Patent Self-Acting Dry Closet. CROYDON, 1879.
- PARKER, J., *Woodstock*, for Dry Earth Com- mode without Separator. EXETER, 1880.
- PATENT VICTORIA STONE COMPANY, *Kingsland Road, E.*, for Artificial Stone Tubes. CROYDON, 1879.
- \*POCOCK BROS., *Southwark Bridge Road, S.E.*, for "Universal" Tubular Air and Water Bed. CROYDON, 1879.
- POTTS & Co., *Handsworth, Birmingham*, for Edinburgh Air-Chambered Sewer Trap. STAFFORD, 1878.
- PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Warming and Ventilating Appliances. STAFFORD, 1878.
- PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Thermometrical Instruments. STAFFORD, 1878.
- \*PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Improvements in Hollow Tile Floor- ing. CROYDON, 1879.

- PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, CROYDON, 1879.  
for Barometrical and Thermometrical Instruments.
- PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, EXETER, 1880.  
for Corrugated Iron Hot-Water Warming Appliances.
- PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, EXETER, 1880.  
for Improvements in Thermometrical and Barometrical Instruments.
- RANSOME, S. E., & Co., 10, *Essex Street, W.C.*, CROYDON, 1879.  
for "Milwaukee" Glass Lantern or Hurricane Lantern.
- RUFFARD & Co., *Clay Works, Stourbridge*, for STAFFORD, 1878.  
Porcelain Baths, moulded and glazed in one piece.
- \*SALMON, BARNES & Co., *Ulverston*, for Revolving EXETER, 1880.  
Shutters with Patent Balance Weight Motion.
- \*SANITARY APPLIANCE COMPANY, *Factory Lane, Salford*, for Patent Cinder-Sifting Ash Closet. CROYDON, 1879.
- SELIG, SONNENTHAL & Co. (Limited), *Lambeth Hill, Queen Victoria Street, E.C.*, for Patent CROYDON, 1879.  
Safety Belt Shippers.
- SHARP, JONES & Co., *Bourne Valley Pottery, Poole, Dorset*, for Rock Concrete Tubes. CROYDON, 1879.
- SHARP, C. H. & Co., *High Holborn, E.C.*, for EXETER, 1880.  
Ornamental Inlet Ventilators.
- SHONE, ISAAC, *Wrexham*, for Pneumatic Liquid STAFFORD, 1878.  
Ejector.
- SILICATED CARBON FILTER COMPANY, *Battersea*, EXETER, 1880.  
for Silicated Carbon Double Chambered Table Filters.
- SINCLAIR, J., 104, *Leadenhall Street, E.C.*, for CROYDON, 1879.  
Chemical Fire Exterminator.
- SKINNER, G. H., 13, *North Street, Exeter*, for EXETER, 1880.  
Seltzer, Soda, and Potash Waters, and Orange Quinine Tonic.
- SNELL, H. SAXON, *Southampton Buildings*, for STAFFORD, 1878.  
the Thermhydic Ventilating Hot-Water Open Fire Grate.
- STEPHAN, J. A., *Worcester*, for Carbonised Iron EXETER, 1880.  
Stone Mound Filter for Water.
- STIDDER & Co., 50, *Southwark Bridge Road, S.E.*, CROYDON, 1879.  
for Swivel, Lock Plug, and Overflow for Sink.
- STIFF, JAMES, & SONS, *Lambeth, London*, for STAFFORD, 1878.  
Weaver's Ventilating Sewer Air Trap.
- STRETTON, S., *Kidderminster*, for a Folding CROYDON, 1879.  
Bier and Car for Simplifying Funerals.
- THORN & Co., *Stafford*, for Artificial Stone STAFFORD, 1878.  
Filters, for Cleansing Rain Water for Domestic Use.



- TYLOR, J., & SONS, 2, *Newgate Street, E.C.*, for EXETER, 1880.  
"Clear Way" Regulator Valve Water Closet,  
without overflow communicating with Valve  
Box.
  - TYLOR, J., & SONS, 2, *Newgate Street, E.C.*, for EXETER, 1880.  
Improved Enamelled Iron Slop Sink, with  
Patent Regulator Supply Valve.
  - TYLOR, J., & SONS, 2, *Newgate Street, E.C.*, for EXETER, 1880.  
Improved Full-Way Stop Valve.
  - TYLOR, J. & SONS, 2, *Newgate Street, E.C.*, for EXETER, 1880.  
"Waste Not" Regulator Valve.
  - WALLER, THOS., 47, *Fish Strert Hill, E.C.*, for CROYDON, 1879.  
Cooking Stove with Warm-Air Chamber.
  - WEBSTER & Co., *Nottingham*, for Webster's CROYDON. 1879.  
Patent Photometer.
  - WENHAM & Co., *Church Street, Croydon*, for CROYDON, 1879.  
Boyle's Mica-Valved Outlet Ventilator.
  - WILLCOCK & Co., *Burmantofts, Leeds*, for Fire- CROYDON, 1879.  
Clay Sanitary Sinks, and Water Troughs.
  - WILLEY & Co., *Exeter*, for their Exhibit of EXETER, 1880.  
Gaseliers and Gas Brackets.
  - \*WIPPELL BROS. & ROW, 231, *High Street, Exeter*, for Moule's Earth Closet. EXETER, 1880.
  - WIPPELL BROS. & ROW, 231, *High Street, Exeter*, for Ransome's Artificial Stone Air EXETER, 1880.  
Brick.
  - WIPPELL BROS. & ROW, 231, *High Street, Exeter*, for Conservatory Boiler, with Hot-Water EXETER, 1880.  
Pipe.
  - WIPPELL BROS. & ROW, 231, *High Street, Exeter*, for Cottage Range EXETER, 1880.
  - WIPPELL BROS. & ROW, 231, *High Street, Exeter*, for Chappiuss Daylight Reflector. EXETER, 1880.
  - WIPPELL BROS. & ROW, 231, *High Street, Exeter*, for Fernby's "Paragon" Camp Fur- EXETER, 1880.  
niture.
  - WIPPELL BROS. & ROW, 231, *High Street, Exeter*, for Improved Housemaid's Box with Sifter. EXETER, 1880.
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## PAPERS AND ADDRESS READ AT THE CONGRESSES OF THE INSTITUTE.

### PRESIDENT'S ADDRESS.

- B. W. RICHARDSON, M.D., F.R.S. A Theory as to the Natural or Glandular Origin of the Contagious Diseases. LEAMINGTON, 1877
- E. CHADWICK, C.B. The need of reform in the Administrative Organisation of the Sanitary Service, with special reference to the Appointment of Medical Officers of Health. STAFFORD, 1878.
- B. W. RICHARDSON, M.D., F.R.S. Salutland, an Ideal of a Healthy People. CROYDON, 1879.
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- Engineers**, Institution of Civil, List of Fellows. INSTITUTION OF CIVIL ENGINEERS.
- Field, Rogers, M.Inst.C.E.**, Bye-Laws and Regulations with reference to House Drainage. ROGERS FIELD, C.E.
- Fitzgerald, Vesey**, Public Health and Local Government Act, 1875. WATERLOW BROS. & LAYTON.
- Foster, R. le Neve**, Specimens of Arsenical and Non-Arsenical Wall Papers. R. LE NEVE FOSTER.
- Fox, Cornelius**, The Disposal of the Slop Water of Villages. J. & A. CHURCHILL.
- Gabba, Luigi**, Se i cimiteri possano esercitare un'influenza dannosa alla pubblica salute. LUIGI GABBA.
- Galton, Capt. Douglas, R.E., C.B.**, On the Construction of Healthy Dwellings. CAPT. DOUGLAS GALTON, R.E., C.B., F.R.S.
- Gardiner, T. J.**, Report to the State Board of Health on the methods of Sewerage for Cities and large Villages in the State of New York. COL. G. E. WARING, jun.
- Gas Institute**, Report of the Extraordinary Meeting held at the Crystal Palace. MAGNUS OHREN, C.E.
- Giudice, F. Del.**, Delle Combustioni Spontanee. WIDOW OF COMM. F. DEL GIUDICE.
- Giudice, F. Del.**, Relazione Finale per l'anno Scolastico 1878-1879. WIDOW OF COMM. F. DEL GIUDICE.
- Giudice, F. Del.**, Delle Scuole Agrarie Industriali e Commerciali. WIDOW OF COMM. F. DEL GIUDICE.
- Giudice, F. Del.**, Gli Apparecchi Elettrici Avvisatori Degli Incendi. WIDOW OF COMM. F. DEL GIUDICE.
- Giudice, F. Del.**, Intorno ad un Novello Avvisatore del Principio degli Incendi, e delle Temperature. WIDOW OF COMM. F. DEL GIUDICE.
- Giudice, F. Del.**, Manuale Practico per gli Incendi. WIDOW OF COMM. F. DEL GIUDICE.

- Giudice, F. Del.**, Degli Ammaestramenti dell'Arte di Spegner gli Incendi. WIDOW OF COMM.R.  
F. DEL GIUDICE.
- Giudice, F. Del.**, Ragguaglio Intorno ad Alcuni Strumenti e Macchine Agrarie. WIDOW OF COMM.R.  
F. DEL GIUDICE.
- Giudice, F. Del.**, Relazione de Lavori Accademici della Instituto D'Incorragemento 1879. WIDOW OF COMM.R.  
F. DEL GIUDICE.
- Giudice, F. Del.**, In Morte de Commr. WIDOW OF COMM.R.  
F. DEL GIUDICE.
- Hart, E.**, Report on Local Legislation as to Infectious Diseases. G. J. SYMONS, F.R.S.
- Health Lectures** delivered in Edinburgh during 1880-81. PURCHASED.
- Health of Towns Commission**, First Report. Vols. 1 & 2. PURCHASED.
- Health of Towns Commission**, Second Report. Vols. 1 & 2. PURCHASED.
- Hellyer, S.**, The Plumber and Sanitary Houses. B. T. BATSFORD.
- Hering, Rudolph**, Report on European Sewerage Systems. RUDOLPH HERING.
- Hodgson, J. S., C.E.**, Rivers Pollution Legislation. JOHN S. HODGSON, C.E.
- House of Commons**, Ventilation and Lighting of the House of Commons, Second Report. PURCHASED.
- Husson, C.**, L'Alimentation Animale. C. HUSSON.
- Hutton** Collection of Fossil Plants, Catalogue. NORTH OF ENGLAND INSTITUTE OF MINING AND MECHANICAL ENGINEERS.
- Hygiene**, Instruccoes para se regular provisoriamente o Serviço, do laboratorio municipal de Hygiene. MUNICIPAL COUNCIL OF LISBON.
- Ingenieurs Civil Société des**, Congres de Reims. A. DURAND CLAYE.
- Inman, W. S.**, On the Report of the Committee of the House of Commons on Ventilation, Warming, and Transmission of Sound. PURCHASED.
- Innes, Cosmo, M.Inst.C.E.**, and **Burton, W. K.**, Sanitary Inspection of Dwelling Houses. G. J. SYMONS, F.R.S.
- Lambeth Parish**, Twenty-Fifth Annual Report of the Proceedings of the Vestry. DR. A. FARR.
- Le Grand, A.**, Paper on Tube Wells. A. LE GRAND.



- Levantine Plague**, Papers Relating to the Modern History and Recent Progress of.
- Lindley, Dr., and W. Hutton**, Illustrations of Fossil Plants.
- Local Government Board**, General Orders and Regulations for Inspectors of Nuisances.
- Local Government Board**, Report of Committee to inquire into the several modes of treating Town sewage.
- Löwenberg, Dr. B.**, Le Furoncle de L'Oreille et la Furunculose.
- London Sanitary Committee**, Report of, with Half-yearly Report of the Medical Officer of Health for the Port of London.
- Longhi, G.**, Igiene dell'Orecchio.
- Lumley**, Public Health Act, 1875.
- McLeod, K., M.D.**, Report of the Health of Calcutta for the year 1881.
- Manning, R., M.Inst.C.E.**, Sanitary Works Abroad.
- Marie-Davy, Dr. H.**, Assainissement de Paris — Système du tout à l'Égout. Canalisation Spéciale des Vidanges.
- Medical Officers of Health**, Society of. Transactions. Session 1879-80.
- Medical Society of the County of Kings**, Proceedings, 1881.
- Meldrum, C.**, The Relation of Weather to Mortality, and The Climatic Effects of Forests.
- Melisurgo, G. C.**, Ingegnerie Sanitarie ed Urbane.
- Metcalf, R., F.S.S.**, Sanitas Sanitatum et omnia Sanitas.
- Meteorological Record.**
- Meteorological Societies**, The History of English.
- Meteorological Society**, Quarterly Journal and List of Fellows.
- Metropolitan Board of Works**, Bye-Laws with reference to Streets, Buildings, Slaughter-houses, Cowsheds, &c.
- Metropolitan Board of Works**, Report for 1881.
- DR. G. B. LONGSTAFF.**
- NORTH OF ENGLAND INSTITUTION OF MINING AND MECHANICAL ENGINEERS.**
- THE LOCAL GOVERNMENT BOARD.**
- DR. G. B. LONGSTAFF.**
- DR. B. LÖWENBERG.**
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- SHAW & SON.**
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- DR. PROSPER DE PIETRA SANTA.**
- SOCIETY OF MEDICAL OFFICERS OF HEALTH.**
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- C. MELDRUM, F.R.S.**
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- PURCHASED.**
- METEOROLOGICAL SOCIETY.**
- METEOROLOGICAL SOCIETY.**
- METEOROLOGICAL SOCIETY.**
- BOARD OF WORKS.**
- J. BAXTER.**

- Metropolitan Sanitary Commission.** First Report and Evidence. PURCHASED.
- Michael, W. H., Q.C.,** A Paper on Compulsory Notification of Infectious Diseases. W. H. MICHAEL, Q.C.
- Middleton, R. E., C.E.,** House Drainage, Sewerage and Ventilation. R. E. MIDDLETON, C.E.
- Mining and Mechanical Engineers,** North of England Institute of, General Index to Transactions. Vols. 1 to 25. 1852-76. MINING ENGINEERS.
- Mining and Mechanical Engineers,** North of England, Institute of, Transactions. Vol. 31. INSTITUTE OF MINING AND MECHANICAL ENGINEERS.
- National Board of Health,** Report for 1879. T. J. TURNER.
- Nixon, Newton H.,** A History of the North London or University College Hospital, from its foundation to the year 1881. NEWTON H. NIXON.
- Northumberland and Durham,** Account of the Strater, Vol. 1 and 2. NORTH OF ENGLAND INSTITUTE OF MINING AND MECHANICAL ENGINEERS.
- Parkes Museum of Hygiene,** Official Catalogue of the International Medical and Sanitary Exhibition, 1881. MARK H. JUDGE.
- Parkes' Practical Hygiene,** 5th Edition. J. & A. CHURCHILL.
- Parry, J., C.E.,** Water: its Composition, Collection, and Distribution. F. WARNE & Co.
- Pentonville Prison,** Report on the Construction, Ventilation, and Details of, 1844. PURCHASED.
- Pettenkofer, Dr. Max Von,** The Air in relation to Clothing, Dwelling, and Soil. PURCHASED.
- Pini, Dr. Gaetano,** L'Acqua Potabile a Milano. Le Acque del Brembo. Il Gozzo Note Critiche. DR. GATENA PINI.
- Pollution of Rivers,** Sixth Report of the Commissioners appointed in 1868 to inquire into the best means of Preventing. DR. G. B. LONGSTAFF.
- Prisons,** Second Report of the Surveyor-General on the Construction of Prisons, 1847. PURCHASED.

#### PERIODICALS:—

- Journal D'Hygiène** (weekly). DR. PROSPER DE PIETRA SANTA.
- Journal für Gesundheitspflege.** M. AUSPITZ.
- Journal of Medicine and Dosimetric Therapeutics** (monthly). DR. T. L. PHIPSON.

<b>Land</b> (weekly).	THE EDITOR.
<b>L'Hygiene Pratique</b> (weekly).	THE EDITOR.
<b>Lisboa</b> , Boletim Hebdomadario de Estatistica Demographica e Medica.	
<b>Local Government Chronicle</b> (weekly).	THE EDITOR.
<b>Sanitary Engineering</b> (monthly).	THE EDITOR.
<b>Sanitary Engineer</b> , The New York (weekly).	THE EDITOR.
<b>Sanitary Record</b> (monthly).	THE EDITOR.
<b>Society of Arts Journal</b> (weekly).	SOCIETY OF ARTS.
<hr/>	
<b>Bezançon M. F.</b> Rapport Général sur les Travaux du Conseil D'Hygiène Publique.	SOCIÉTÉ FRANCAISE D'HYGIÈNE.
<b>Registrar General</b> , Reports from 1839 to 1855. Nos. 1 to 18.	PURCHASED.
<b>Relazione Finale</b> per L'Anno Scolastico 1878-79 de Preside Degl' Instituti tecnico e Nautical.	WIDOW OF COMMRS. F. DEL GIUDICE.
<b>Report of a Committee</b> appointed by the President of the Local Government Board to enquire into the Several Modes of Treating Town Sewage.	G. J. SYMONS, F.R.S.
<b>Richardson, B. W., M.D.</b> , Sanitary Review. Vols. 2, 3, 4. 1856-7-8.	G. J. SYMONS, F.R.S.
<b>Richardson, C. J.</b> , A Popular Treatise on the Warming and Ventilation of Buildings.	PURCHASED.
<b>Robins, E. C., F.S.A.</b> , Sanitary Science in its Relation to Civil Architecture.	E. C. ROBINS, F.S.A.
<b>Robins, E. C., F.S.A.</b> , Revelations of Sanitary Science.	E. C. ROBINS, F.S.A.
<b>Robinson, H., M. Inst. C.E.</b> , Sewage Disposal. 2nd edition.	PROF. H. ROBINSON, C.E.
<b>Robinson, H., M. Inst. C.E.</b> , Vestry Neglect in Sanitary Matters.	G. J. SYMONS, F.R.S.
<b>Royal Institution</b> , Proceedings, Vol. IX., Parts 1, 2 & 3, and List of Members.	ROYAL INSTITUTION.
<b>Russell, J. B.</b> , Census 1881, Glasgow. The Decennial Census.	DR. J. B. RUSSELL.
<b>Rutherglen, J. H.</b> , The Difficulties as to Isolation and Treatment of Cases of Small-Pox and Fever in the Metropolis.	J. H. RUTHERGLEN.
<b>Sanitary Condition of the Labouring Population of Great Britain</b> , General Report.	PURCHASED.
<b>Sanitary Economy</b> , its principles and practice.	PURCHASED.
<b>Slagg, Charles</b> , Sanitary Work in the Smaller Towns and Villages.	CROSBY, LOCKWOOD & Co.

- Smoke-Preventing Appliances**, Catalogue of the Exhibition of Smoke-Preventing Appliances, 1881. W. R. E. COLES.
- Social Science Association**, Sessional Proceedings, 1882. SOCIAL SCIENCE ASSOCIATION.
- Social Science Association**, Transactions, and List of Members, 1880-81. SOCIAL SCIENCE ASSOCIATION.
- Società Italiana d'Igiene**, Giornale, 1881. SOCIETA ITALIANA D'IGIENE.
- Société Française d'Hygiène**, Guide du Vaccinateur. SOCIÉTÉ FRANCAISE D'HYGIÈNE.
- Société Français D'Hygiène**. Hygiène et Education. Physique de la Deuxième Enfance. DR. PROSPER DE PIETRA SANTA.
- Sormani, E. B.**, Comitato Italiano per l'Esposizione e Congresso Internazionali d'Igiene e Salvataggio a Bruxelles, 1876. E. B. SORMANI.
- Sormani, E. B.**, Ingegneria Idraulica e Sanitaria Scritti Varj. E. B. SORMANI.
- Sormani, E. B.**, Milano Idrografica Con Pianta Topografica. E. B. SORMANI.
- Spice, R. P., M.Inst.C.E.**, The Wanderings of the Hermit of Westminster. R. P. SPICE, C.E.
- Sterfte**, Atlas van Nederland over 1860-1874, 12 Charts. DR. GUYE.
- Streatfield, T. E. C.**, on Disposal of Sewage of Country Houses. T. E. C. STREATFIELD.
- Surveyors**, Institution of. Transactions, Vol. XIII. INSTITUTION OF SURVEYORS.
- Sutcliff, R.**, Patent Abyssinian Tube Wells. R. SUTCLIFF.
- Sutcliff, R.**, Tube Wells for Large Water Supplies. R. SUTCLIFF.
- Symons, G. J., F.R.S.**, British Rainfall, 1865,66,70,77-80. G. J. SYMONS, F.R.S.
- Taylor, P. A., M.P.**, Speech on Dr. Cameron's Resolution respecting Animal Vaccine. P. A. TAYLOR, M.P.
- Tottenham Sanitary Association**, Eighth Annual Report, 1881. J. HOWARD.
- Turner, Thomas J.**, Some Remarks upon National and International Sanitary Jurisprudence. DR. T. J. TURNER.
- Turner, T. J., M.A., M.D.**, The Hygiene of Emigrant Ships. DR. T. J. TURNER.
- Tylor, W. A.**, House Drainage. W. A. TYLOR.
- Wallis, H. Sowerby**, The Snow Storm of January 18th and 19th, 1881. H. SOWERBY WALLIS.



Waring, Col. G. E., Junr., On the Causation of Typhoid Fever.	COL. G. E. WARING, jun.
Waring, Col. G. E., Junr., Draining for Profit and Health. 2nd edition.	COL. G. E. WARING, jun.
Waring, Col. G. E., Junr., Excremental Diseases.	COL. G. E. WARING, jun.
Waring, Col. G. E., Junr., Sanitary Condition of City and Country Dwelling Houses.	COL. G. E. WARING, jun.
Waring, Col. G. E., Junr., Sanitary Drainage of Houses and Towns.	COL. G. E. WARING, jun.
Waring, Col. G. E., Junr., The Sewerage of Memphis, U.S.A.	COL. G. E. WARING, jun.
Waring, Col. G. E., Junr., Storm Water in Town Sewage.	COL. G. E. WARING, jun.
Waring, Col. G. E., Junr., Suggestions for the Drainage of Washington City.	COL. G. E. WARING, jun.
Waring, Col. G. E., Junr., Village Improvements and Farm Villages.	COL. G. E. WARING, jun.
Waring, Col. G. E., Jun., C.E., The Death rate of Memphis.	COL. G. E. WARING, jun.
Waring, Col. G. E., Jun., C.E., History and Present Condition of New Orleans, Louisiana, and Report on the City of Austin, Texas.	COL. G. E. WARING, jun.
Washington, National Board of Health, Weekly Bulletin.	NATIONAL BOARD OF HEALTH.
Waterlow's Architects and Surveyor's Diary, 1882.	WATERLOW BROS.
West Ewing Improvement Association, Proceedings at the Anniversary Meeting, held September 2nd, 1880.	COL. G. E. WARING, jun.
Wilson, G., M.A., M.D., Handbook of Hygiene. 4th edition.	DR. G. WILSON.
Wilson, G., M.A., M.D., Healthy Life and Healthy Dwellings.	DR. G. WILSON.
Wilson, G., M.A., M.D., Sanitary Defects in Villages, and Country Districts.	DR. G. WILSON.
Woolych's Metropolis Local Management Act.	SHAW & SON.

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#### DONATIONS DURING 1881.

			£	s.	d.
CHARLES SHRIMPTON, M.D. (General Fund)	..	..	5	5	0
CHARLES SHRIMPTON, M.D. (Library Fund)	..	..	0	10	6
SAMUEL J. BARBER (        „        )	..	..	0	10	6

# BYE-LAWS.

(For Index to Bye-Laws, see page 164.)

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## ELECTION OF FELLOWS, MEMBERS, ASSOCIATES, HONORARY MEMBERS, AND HONORARY FOREIGN ASSOCIATES.

1. The Institute shall consist of Fellows, Members, Associates, Annual and Life Subscribers, Honorary Members, and Honorary Foreign Associates. The government and management of the Institute shall be vested in the Council, under the Control of the bye-laws, and of the Resolutions of Special General Meetings.

2. Fellows shall be elected by ballot by the Council, and shall include scientific men of eminence, persons of distinction as Legislators or Administrators, and others who have done noteworthy Sanitary work.

3. No person shall be balloted for as a Fellow unless his name has been duly proposed, seconded, and approved by a majority at a previous regular Meeting of the Council, and his name and address, together with the names of the proposer and seconder, inserted in the summons convening the Meeting at which such ballot shall take place.

4. Fellows shall be elected by a majority of the Council present at the Meeting at which their names are brought forward for election, and the votes shall be taken by ballot.

5. Any candidate for membership with the Institute shall procure a recommendation signed by three Fellows or Members, according to Form 1 (see page 160).

6. The names of Candidates for Membership, together with their addresses and the names of the Fellows or Members recommending them, shall be inserted in the summons convening the Meeting of Council at which such candidates are brought forward for election.

7. All Members (except those who have passed the examination and received the certificate of competence for Local Surveyors) shall be elected by a majority of the Council present at the Meeting at which their names are brought forward for election, and the votes shall be taken by ballot.

8. Persons who have obtained the certificate of competence for Local Surveyors are entitled to admission as Members without ballot.

9. Every Candidate for admission as an Associate of the Institute shall procure a recommendation, signed by two Fellows, Members, or Associates, according to Form 2 (see page 160).

10. The names of Candidates, together with their addresses and

the names of the persons recommending them, shall be inserted in the summons convening the Meeting of Council at which such candidates are to be brought forward for election.

11. All Associates (except those who have passed the examination and received the certificate of competence for Inspectors of Nuisances) shall be elected by a majority of the Council present at the meeting at which their names are brought forward for election, and the votes shall be taken by ballot.

12. Persons who have obtained the certificate of competence for Inspectors of Nuisances are entitled to admission as Associates without ballot.

13. The Council shall have the power to elect from time to time distinguished personages as Honorary Members of the Institute, without payment of fees or subscriptions.

14. The Honorary Members elected in each year shall not exceed five in number.

15. The Council shall have power to elect from time to time as Honorary Foreign Associates, gentlemen who have promoted the advancement of Sanitary Science, without the payment of fees or subscriptions.

16. When a person shall have been elected a Fellow, Member, or Associate, the Secretary shall inform him thereof by letter, as soon as possible, in the terms of the Form 3 in the Appendix (page 161); and shall at the same time forward to him a copy of the bye-laws of the Institute, together with a copy of the Form 4 in the Appendix (page 161).

17. Every person so elected shall pay his admission fee and first annual contribution, and shall return the Form 4 duly signed, within three calendar months after the day of his election, otherwise his election shall be void; but the Council shall have the power, in particular cases, of extending the period of such payment and signature respectively.

18. Notice shall be sent by the Secretary to all Honorary Members, and Honorary Foreign Associates, on their election.

19. The names of all Fellows, Members, Associates, Honorary Members, and Honorary Foreign Associates, elected by the Council, shall be entered on the minutes of the Meeting at which they were elected, and a register of the same shall be kept by the Secretary, and also a list of the Subscribers.

20. Honorary Members and Honorary Foreign Associates shall have forwarded to them, by the Secretary, on their election, a copy of the Diploma of the Institute, signed by the President, the Chairman of Council, and the Registrar, in the Form 5 (see page 162).

21. Fellows, Life Members, and Life Associates are entitled to a Diploma, on application to the Secretary.

22. Fellows, Members, and Associates, having occasion to designate themselves as belonging to the Institute, shall state the class to which they belong as follows, viz.:—Fellow San. Inst., Mem. San. Inst., Assoc. San. Inst.

23. A Special Meeting of the Council, consisting of the Chairman of Council and not less than ten members, shall have power to remove any Fellow, Member, or Associate from the Institute, upon receiving a requisition to that effect, with the reasons stated, signed by not less than twenty Fellows or Members of the Institute.

#### SUBSCRIBERS.

24. Persons of either sex may become Subscribers without election or ballot. (See page 162. Form 6.)

25. The amount of the Annual Subscription shall be One Guinea.

26. Annual Subscribers shall be entitled to attend the Anniversary and Ordinary Meetings, and to take part in the same, with free admission to all Congresses, Conversazioni, and Exhibitions held by the Institute, and to make use of the library when formed.

27. Donors of Ten Guineas and upwards are Life Subscribers.

#### CONTRIBUTIONS TO THE FUNDS.

28. Each Fellow shall pay £10. 10s. on taking up the Fellowship, which shall entitle him to all the privileges of the Institute for life, together with a copy of all publications issued by the Institute.

29. Every Member shall pay an Admission Fee of £3. 3s., except Medical Officers of Health and Medical Men holding certificates in Sanitary Science from any University or Medical Corporation, or persons holding the certificate for Local Surveyors granted by the Institute.

30. Each Member shall pay £2. 2s. per annum, except those who have become Life Members, or who have passed the examination for Local Surveyors. Members shall be entitled to all the privileges and advantages of the Institute, together with a copy of all publications issued by the Institute, so long as they continue to pay their subscription.

31. Persons who have passed the examination for Local Surveyors may become Members for Life on payment of £5. 5s.

32. Members elected previous to the 12th December, 1878, shall only be liable to pay the same Subscription as at their election.

33. Every Associate shall pay an Admission Fee of £2. 2s., except those holding the certificate of Inspector of Nuisances granted by the Institute.

34. Each Associate shall pay £1. 1s. per annum, except those who have passed the examination for Inspector of Nuisances. Associates shall be entitled to all the publications issued by the Council so long as they continue to pay their subscriptions.

35. Persons who have passed the examination for Inspectors of Nuisances may become Associates for Life on payment of £3. 3s.

36. All yearly Subscriptions shall be due in advance on the 1st of January in each year. The Subscription shall become due on election.

37. Members, Associates, and Subscribers may commute their Annual Subscription, and become Life Members, Life Associates, and Life Subscribers, on payment of £10. 10s.



38. If the Annual Subscription of any Member or Associate shall be in arrear for two years, the Secretary shall give notice thereof to the Member or Associate; and if the said Subscription shall continue in arrear at the expiration of three months after such notice, the Council (having through the Secretary given the defaulting Member or Associate due notice of their intention) shall have the power to strike the name of such Member or Associate off the Register, and he shall thereupon cease to be a Member or Associate of the Institute: but shall remain liable for any arrears of Subscription which shall be due at the date of his so ceasing to be a Member or Associate.

39. Any Member or Associate desirous of withdrawing from the Institute must give notice in writing to that effect to the Secretary; and on payment of all Subscriptions and arrears which may be due from him up to that period, he shall henceforth cease to be a Member or Associate.

40. Any person whose name shall have been struck off under the foregoing bye-law, may, on payment of his arrears, be readmitted by the Council,

41. No person who shall have ceased to belong to the Institute, either by resignation or otherwise, shall have any claim to have any part of his Entrance Fee or Subscription returned, neither shall he retain any interest in the property belonging to the Institute.

#### ELECTION OF COUNCIL AND OFFICERS.

42. The President, the Vice-Presidents, the Examiners, the Registrar, the Judges, and the Curator of the Exhibitions, the Honorary Foreign Secretaries and the Secretary, shall be elected by the Council.

43. The Council, the Trustees, the Treasurer, and the Auditors shall be elected by the Fellows and Members at the Annual General Meeting.

44. The Council shall prepare a list of persons whom they nominate as eligible to fill the vacancies created by the retiring Members of Council, and of the gentlemen they recommend as eligible to fill the offices of Trustees, Treasurer, and Auditors.

45. The list so prepared shall be the balloting list, and a copy shall be sent to every Fellow and Member at least seven days before the Annual General Meeting.

46. The election shall be by ballot by the Fellows and Members, and shall take place in the following manner:—

Previous to the commencement of the ballot, the Meeting shall choose two or more Fellows or Members as Scrutineers, who shall receive the balloting lists and report the result of the ballot to the Chairman.

Every Fellow and Member intending to vote at the election may, if he think fit, erase any name or names from the balloting list, and may substitute in the place thereof the name or names of any other person or persons, in accordance with the

conditions laid down in Bye-law 51, and shall hand into the Scrutineers such balloting list as aforesaid either with or without such erasure and substitution of names.

On the receipt of such list from the voter, if the voter's qualification be not objected to, or if objected to, and the Chairman shall be satisfied that the voter is duly qualified, the Scrutineers shall deposit such list in the balloting-box. The decision of the Chairman in such matter shall be final.

Any balloting list containing a greater number of names proposed for any office than the number to be elected to such office, shall be absolutely and wholly void, and shall be rejected by the Scrutineers.

If the votes in any case be equal, the Chairman shall give the casting vote.

The ballot shall commence not sooner than four o'clock P.M., and shall continue open for one hour.

#### THE PRESIDENT AND VICE-PRESIDENTS.

47. The President shall be elected by the Council at a meeting specially convened for that purpose, and shall be a person distinguished for the interest he has taken in the promotion and advancement of Sanitary Science.

48. The President shall be *ex-officio* a member of the Council and of all Committees, and shall take the chair by right at all meetings of the Institute, of the Council, and of the Committees, at which he is present.

49. The Council shall have power to elect as Vice-Presidents persons distinguished for the interest they have taken in sanitary work.

50. The Vice-Presidents shall be elected annually, and shall not exceed six in number, and shall be *ex-officio* members of the Council.

#### THE COUNCIL.

51. The Council shall consist of twenty-four Fellows and Members (in addition to the *ex-officio* Members). Not less than two-thirds of these twenty-four shall be Fellows.

52. The President, Vice-Presidents, Trustees, Treasurer, and Registrar shall be *ex-officio* Members of Council.

53. The Council shall have the direction and management of the concerns of the Institute, the appointment and dismissal of the paid officers and attendants, and the prescribing of their respective duties, subject to the control of the bye-laws, and of all resolutions of meetings which have been duly summoned and held in accordance with the bye-laws, and which resolutions have been duly entered on the Minutes and confirmed.

54. Any casual vacancies occurring in the Council may be filled up by the remaining members thereof.

55. At each Annual General Meeting one-fourth of the twenty-four elected Members of the Council shall retire, and shall not be

eligible for re-election for one year. The Council shall submit to the Annual Meeting the names of the six gentlemen whom they recommend to fill up the vacancies.

56. The Secretary shall forward a printed list, with his initials attached, to each Member of Council (including *ex-officio* members) of the names of the existing *elected* Members of Council, and the number of attendances of each Member, at least seven days prior to the ordinary Monthly Meeting of the Council in March. Each Member of Council present at such meeting shall strike off from the list the names of six Members whom he suggests for retirement, and shall deliver the same, enclosed in a blank envelope, to the Chairman, who shall announce the names of the retiring Members.

57. Upon such announcement the Members present shall proceed by ballot to choose six other Fellows or Members to be recommended to the Annual General Meeting, to take the places of the retiring Members.

58. At the first meeting after their election the Council shall proceed to elect, by ballot, a Chairman and Vice-Chairman, who shall be *ex-officio* Members of all Committees.

59. The Chairman of the Council after two years' service shall not be re-eligible to the office for at least one year.

60. All matters requiring immediate decision, and occurring between the date of one Council Meeting and another, shall be decided by the Chairman of the Council at his discretion, subject to confirmation at the next meeting of Council.

61. The Council shall meet on the fourth Thursday in every month, except during the months of August and September.

62. Five members of the Council shall constitute a quorum.

63. All questions shall be decided in the Council by vote, unless a ballot is provided for or demanded. The Chairman shall have a second or casting vote.

64. At each meeting of Council the Minutes of the previous meeting shall be read, and if approved as correct, shall be signed by the Chairman of the meeting.

65. The Minutes of each Annual and Special General Meeting shall be read and signed in a similar manner by the Chairman presiding at the first meeting of Council after such Annual or Special General Meeting.

66. A Special Meeting of the Council shall be summoned on the Secretary receiving a notice to do so, signed by the Chairman or any five Members of Council, describing the business intended to be brought forward. Seven days' notice, at least, shall be given of any Special Meeting of Council; such notice to state particularly the business for which the Special Meeting has been summoned, and no other business to be entered upon.

67. All Committees shall be appointed by the Council.

68. No act, order, or resolution of any Committee shall bind the Institute, unless it be done or made by the direction and authority of the Council or be ratified by them.

69. A statement of the funds of the Institute and of the receipts

and payments during the past year shall be made up to the 31st of December, under the direction of the Council; and after having been verified and signed by the Auditors shall be laid before the Annual General Meeting.

70. The Council shall draw up a yearly report on the state of the Institute, which shall be read at the Annual General Meeting.

71. The Council shall have power to elect as Corresponding Members of Council, Fellows and Members of the Institute who have distinguished themselves in the cause of Sanitary Science, and aided in promoting the objects of the Institute.

72. The names of all Corresponding Members of Council shall be entered on the Minutes of the meeting at which they were elected, and shall be printed in the Calendar.

73. As early as possible in each year the Council shall cause to be published a Calendar of the Institute for the year, a copy of which, together with all other Reports of proceedings and catalogue of Exhibitions, shall be supplied free of charge to all Fellows, Members, Associates, and Subscribers.

74. The Council shall arrange for the publication of the papers read at the meetings, or of such documents as may be calculated to advance Sanitary knowledge: and they shall have power to make such arrangements for carrying into effect the bye-laws, and for the general management of affairs, as in their opinion may from time to time be necessary.

#### THE MEETINGS.

75. The Meetings of the Institute shall be as follows:—

- 1st. The Annual General Meeting of Fellows and Members only.
- 2nd. Special General Meetings of Fellows and Members only, for the purpose of making, altering, and establishing Bye-laws and Regulations, or for any other special business for which such meeting may be convened.
- 3rd. The Anniversary Meeting.
- 4th. Ordinary Meetings.

76. The Annual General Meeting shall be held in May in each year, at four o'clock in the afternoon, to receive and deliberate upon the Report of the Council on the state of the Institute with the annual statement of the Accounts, and to elect the Council and Officers for the ensuing year.

77. No question shall be discussed, or motion be made, at the Annual General Meeting, the Anniversary Meeting, or Ordinary Meetings, relative to the direction and Management of the concerns of the Institute: such direction and management being vested in the Council, under the control of the bye-laws, and of the Resolutions of Special General Meetings.

78. The Council may at any time call a Special General Meeting of Fellows and Members for a specific purpose relative to the direction and management of the concerns of the Institute; and the Council



Law W Fooks - May 16<sup>th</sup>

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He said -

According to Bye Law 77  
Recommendations of any kind  
would be strictly out of order  
at the Annual meeting  
but if reasonable might be  
admitted at the discretion of  
the Chairman

---

That the members can only discuss  
the report & cannot move for  
information that is not given

---

That the ordinary statement of  
accounts for 1887 practically conform  
to Bye Law 69

1000

shall at all times call such meeting within fourteen days on a requisition in writing, signed by twenty, being either Fellows or Members, specifying the nature of the business to be transacted.

79. A notice shall be sent to those Fellows and Members who reside in the United Kingdom, at least seven days before the time appointed by the Council for such Special General Meeting; and the notice shall specify the nature of the business to be transacted, and no other business shall be transacted at that meeting. All Fellows and Members shall have a right, subject to the provision of Bye-law No. 85, to attend and vote, and twenty shall constitute a quorum.

80. The Fellows and Members of the Institute may from time to time, by resolution of a Special General Meeting confirmed at a subsequent Special General Meeting held not less than seven and not more than fourteen days after the former meeting, make, alter, or repeal such bye-laws as they may think fit.

81. At all General Meetings the Chair shall be taken by the President, or, in his absence, by one of the Vice-Presidents, or by the Chairman of the Council, or by some Member to be chosen by the meeting.

82. The Chairman shall have a second or casting vote at all General Meetings; and in all matters in dispute his decision shall be final.

83. Motions made at any General Meeting of the Institute shall be in writing, and signed by the Mover and Seconder.

84. All Fellows and Members are entitled to take part in the Annual General Meeting, subject to the provisions contained in these bye-laws, and ten shall form a quorum.

85. No Fellow or Member, whose Fees or Subscriptions are in arrear, shall be entitled to be present, to debate, or to vote at any General Meeting.

86. The Anniversary Meeting shall be held on the second Thursday in July in each year, to commemorate the formation of the Institute, when an address shall be delivered, to be called the "Annual Address."

87. The presentation of the Medals and Certificates of Merit awarded to successful Exhibitors shall be made at the Anniversary Meeting.

88. No business shall be transacted at the Anniversary Meeting except the delivery of the Address and the discussion arising thereupon.

89. All Fellows, Members, Associates, Honorary Members, Honorary Foreign Associates, and Annual and Life-Subscribers shall be entitled to attend and to take part in the proceedings at the Anniversary Meeting, and at the Ordinary Meetings.

90. Every Fellow or Member shall have the privilege of introducing one stranger, to be present at the Anniversary Meeting, or at the Ordinary Meetings of the Institute, on writing his name in a book provided for that purpose, or sending with him a card signed with his name, according to a form provided.

91. The Council shall arrange, at their first meeting in October, a programme of the Ordinary Meetings to be held during the Session for the reading and discussion of papers, and the delivery of Lectures and Addresses.

92. A copy of such programme shall be supplied to every Fellow, Member, Associate, and Subscriber.

93. The Council shall appoint a Committee of Referees, to whom all papers shall be referred before being read.

94. The business of the Ordinary Meetings of the Institute shall be conducted as nearly as possible in the following order:—

1. The Minutes of the preceding meeting to be read, and after having been approved as correct, to be signed by the Chairman.
2. Communications from the Council to be brought forward.
3. A list of the names of those persons who have joined the Institute since the previous Ordinary Meeting to be read.
4. Original Communications to be read and discussed.

#### THE EXAMINERS AND EXAMINATIONS.

95. A Board of Examiners shall be appointed once a year by the Council to carry out the Examinations for Local Surveyors and Inspectors of Nuisances, and a Certificate shall be granted to successful Candidates, signed by the Examiners, according to Form 7 (see page 163).

96. The times and places for holding the Examinations shall be determined by the Council.

97. The names of the Examiners, the syllabus of subjects for Examination, and the printed questions set at each Examination during the year, together with the list of successful candidates, and full particulars relating to the Examinations, shall be published in the Annual Calendar of the Institute, under the authority of the Council.

98. The fees charged for the Examination and Certificate shall be as follows:—For local Surveyors, Five Guineas; for Inspectors of Nuisances, Two Guineas. Unsuccessful Candidates are entitled to present themselves a second time for one fee.

#### THE REGISTRAR.

99. The Registrar shall sign all certificates and diplomas, and shall keep the Register of persons certificated by the Institute. In concert with the Board of Examiners he shall prepare an Annual Report of the Examinations, to be presented to the Council.

#### THE TREASURER AND AUDITORS.

100. The Treasurer shall receive all money due to the Institute, and shall pay it into a bank in London appointed by the Council.



101. All moneys, except investments, shall be kept at such bank in the name of the Institute.

102. The Treasurer shall make all payments ordered by the Council by cheque, signed by himself and countersigned by the Secretary.

103. He shall cause an account to be kept of all receipts and payments.

104. No cheque shall be drawn without a previous vote of the Council, except such sums as may be required for petty cash.

105. All receipts for Fees and Subscriptions paid to the Institute shall be signed by the Treasurer or the Secretary.

106. The Accounts shall be audited once a year by the Auditors elected by the Annual General Meeting.

107. The Auditors shall have access at all reasonable times to all books and accounts of the Institute, and shall sign the Annual Statement of Accounts before it is submitted to the Council.

#### THE SECRETARIES.

108. The Council shall have power to appoint any gentlemen at their discretion as Honorary Foreign Secretaries.

109. The Secretary shall be appointed by the Council, and shall receive such remuneration and be subject to such notice as the Council may from time to time think fit.

110. He shall give security to the satisfaction of the Council, and he shall not be engaged in any other business or profession whatever.

111. The Secretary shall, under the direction of the Council, conduct the correspondence of the Institute, attend all meetings of the Institute, of the Council (and of the Committees when required); take Minutes of the proceedings of such meetings, and read the Minutes of the preceding meetings.

112. He shall issue all notices of meetings, and shall prepare, under the direction of the Council, an Annual Report of the state of the Institute. He shall have the superintendence of all persons employed and paid by the Council under him, and shall conduct the ordinary general business of the Institute.

113. The Secretary shall attend to the collection of the Subscriptions; he shall prepare the statement of the expenditure of the funds, and present all accounts to the Council for inspection and approval.

114. The Secretary shall prepare lists when required of those Members whose Subscriptions are in arrear, and report the same to the Treasurer.

115. He shall, under the direction of the Treasurer, keep the accounts of the Institute.

116. The Secretary shall attend all meetings of the Board of Examiners, shall take the minutes of such meetings, and read the Minutes of preceding meetings. He shall issue all notices relating to Examinations.

## THE LIBRARY.

117. With a view to the formation of a Library and Collection, all Fellows, Members, and Associates are expected, within twelve months after their election, to deliver to the Council an original paper on some subject connected with Sanitary Science, or to make a donation to the Library or Collection.

118. The Library shall be under the direct control and government of the Council.

119. A Catalogue shall be prepared and kept of all books belonging to the Library.

120. The name of the donor shall be entered in every book presented to the Institute.

## THE EXHIBITIONS.

121. Previous to the holding of any Exhibition by the Institute, the Council shall issue a prospectus containing the Rules, Regulations, and Conditions, with full particulars relating to such Exhibition.

122. A Catalogue of each Exhibition shall be published under the direction of the Council.

123. The Judges shall make their Report exclusively to the Council, by whom the Medals and Certificates of Merit shall be awarded, and such Medals and Certificates shall be presented at the Anniversary Meeting. (See page 163. Form 8.)

## THE CONGRESSES.

124. The Council shall hold Congresses at such times and places at they may deem most convenient, at which addresses shall be delivered and papers read and discussed, upon subjects of general interest relating to Sanitary Science.

125. The Council shall issue a prospectus previous to the holding of each Congress, setting forth the particulars relating to such Congress.

126. At each Congress the Council shall issue "Congress Tickets," entitling the holder to admission to all the meetings held in connection with the Congress. The price of the "Congress Tickets" shall be Half-a-Guinea each.

## THE PROPERTY OF THE INSTITUTE.

127. The property and effects of the Institute of what kind soever shall be vested in three Trustees for the use of the Institute, and in furtherance of the objects for which it has been established.

128. Under no pretence whatever shall the property and effects, or the income or revenue of the Institute derived from the voluntary contributions or otherwise howsoever, be applied in making any dividend, gift, division or bonus unto or between any one belonging to the Institute, excepting in the case of the fees received on account of the Examinations.

129. Every paper and contribution presented to the Institute shall be considered the property thereof, unless there shall have been some previous arrangement to the contrary, and the Council may publish the same in any way and at any time they may think proper to do so.

130. Should the Council refuse or delay the publication of any paper beyond a reasonable time, the author thereof shall have a right to copy the same, and to publish it as he may think fit, having previously given notice in writing to the Secretary of his intention to do so. No person shall publish or give his consent for the publication of any communication presented and belonging to the Institute without the previous consent of the Council.

#### DONATIONS AND BEQUESTS.

131. The names of all persons who have presented any additions to the Library or to the Collection of Plans, Models, &c., or who have made any voluntary contribution to the funds of the Institute, shall be recorded and published as benefactors to the Institute.

132. Every person desirous of bequeathing to the Institute any Manuscripts, Books, Maps, Plans, Drawings, Instruments, or other personal property, is requested to make use of the following form in his will:—

#### *Form of Bequest.*

‘I give and bequeath to the SANITARY INSTITUTE OF GREAT BRITAIN in London [*here enumerate and particularise the effects or property to be bequeathed*]. And I hereby declare that the receipt of the Treasurer of the said Institute for the time being shall be an effectual discharge to my executors for the said legacy or bequest.’

## APPENDIX.

## FORM 1.

## SANITARY INSTITUTE OF GREAT BRITAIN.

## FORM OF APPLICATION FOR ADMISSION OF MEMBERS.

*(This form must be signed by at least Three Fellows or Members of the Institute.)*

Name \_\_\_\_\_

Place of Residence \_\_\_\_\_

Title, Profession, or Occupation \_\_\_\_\_

being desirous of becoming a Member of the SANITARY INSTITUTE OF GREAT BRITAIN, we, the undersigned, do recommend him as in every respect a proper person to be elected a Member of the Institute.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 18 .

This application was read on the \_\_\_\_\_  
and balloted for on the \_\_\_\_\_

## FORM 2.

## SANITARY INSTITUTE OF GREAT BRITAIN.

## FORM OF APPLICATION FOR ADMISSION OF ASSOCIATES.

*(This Form must be signed by at least Two Fellows, Members, or Associates of the Institute.)*

Name \_\_\_\_\_

Place of Residence \_\_\_\_\_

Title, Profession, or Occupation \_\_\_\_\_

being desirous of becoming an Associate of the SANITARY INSTITUTE OF GREAT BRITAIN, we, the undersigned, do recommend him as a proper person to be elected an Associate of the Institute.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 18 .

This Application was read on the \_\_\_\_\_  
and balloted for on the \_\_\_\_\_



**FORM 3.****SANITARY INSTITUTE OF GREAT BRITAIN.**

\_\_\_\_\_18 .

SIR,

I have the honour to inform you that you have this day been elected a \_\_\_\_\_ of the SANITARY INSTITUTE OF GREAT BRITAIN. I forward you herewith a copy of the Bye-laws of the Institute, together with a form, which you are requested to sign and return to me with the admission fee and annual subscription, amounting to \_\_\_\_\_, within three months of the date of your election.

I am, Sir, &amp;c.,

\_\_\_\_\_  
*Secretary.***FORM 4.**

I, the undersigned, having been elected a \_\_\_\_\_ of the SANITARY INSTITUTE OF GREAT BRITAIN, do hereby promise that I will be governed by the Bye-Laws and Regulations of the said Institute, as they are now formed, or as they may hereafter be altered or amended; that I will advance the objects of the said Institute as far as shall be in my power; and that I will attend the Meetings thereof as often as I conveniently can. Provided, however, that whenever I shall signify in writing to the Secretary that I am desirous to withdraw my name therefrom, I shall (after the payment of any arrears which may be due by me at that period, and after giving up my Books, Papers, or other property belonging to the Institute, in my possession or entrusted to me), be free from this obligation.

Witness my hand this \_\_\_\_\_ day of \_\_\_\_\_ 18

l

## FORM 5.

## Diploma.

This is to certify that at a Meeting of the Council of  
THE SANITARY INSTITUTE OF GREAT BRITAIN duly convened

---

was enrolled as

---

And this our Diploma was duly conferred upon him.

Witness our hands this                      day of                      18

---

*President.*

---

*Chairman of Council*

---

*Registrar.*

## FORM 6.

## SANITARY INSTITUTE OF GREAT BRITAIN.

---

FORM OF APPLICATION FOR ENROLMENT OF SUBSCRIBERS.  
To the Council.

I desire to be enrolled\* \_\_\_\_\_

---

of the SANITARY INSTITUTE OF GREAT BRITAIN.

Name \_\_\_\_\_

Title, Profession, or Occupation

---

Address \_\_\_\_\_

Date \_\_\_\_\_

Donors of Ten Guineas, or upwards, are Life Subscribers. Sub-  
scribers of One Guinea are Annual Subscribers.

\* State here whether as Life Subscriber or Annual Subscriber.

## FORM 7.

## Certificate

OF

THE SANITARY INSTITUTE OF GREAT BRITAIN.

\_\_\_\_\_ having been examined by  
the Officers of the Board appointed for that purpose, and in their  
opinion having been found competent, as regards his Sanitary know-  
ledge, to discharge the duties of

\_\_\_\_\_  
The Council of the SANITARY INSTITUTE OF GREAT BRITAIN, at a  
Meeting duly convened, ordered this certificate to be granted.

Witness our hands \_\_\_\_\_ day of \_\_\_\_\_ 18 .

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ } *Examiners.*

\_\_\_\_\_ *Registrar*

## FORM 8.

## Certificate of Merit.

Awarded by the Council of THE SANITARY INSTITUTE OF GREAT  
BRITAIN.

To

\_\_\_\_\_

For

\_\_\_\_\_

Exhibited at the Exhibition of the Institute, held at

\_\_\_\_\_

By Order.

\_\_\_\_\_ *Secretary.*

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44/115/-

## HONORARY FOREIGN ASSOCIATES.

- PROF. LUDOVIC BRUNETTI, Padua.
- DR. LADREIT DE LA CHARRIÈRE, Médecin-en-Chef des Sourds-muets, 1, Rue Bonaparte, Paris.
- A. DURAND CLAYE, Ingénieur des Ponts et Chaussées, 89, Rue Richelieu, Paris.
- MARIÉ-DAVY, Président Société Française d'Hygiène a l'Observatoire de Montsouris.
- DR. P. L. DURANT, Professeur d'Hygiène, Geneva.
- P. DUVERNEY, 8, Place l'Anvers, Paris.
- LUIGI GABBA, Milan.
- DR. GALEZOWSKI, 29, Boulevard Haussman, Paris.
- J. C. JÄGER, Heerengracht, Amsterdam.
- ALPHONSE JOLTRAIN, Séc. de la Société Française d'Hygiène, 49, Avenue Wogram, Paris.
- BARRON LARREY, 91, Rue de Lille, Paris.
- DR. MALACHIA DE CRESTOFORIS, Milan.
- MOUTARD MARTIN, 9, Rue de l'Echelle, Paris.
- MARIANI, 41, Boulevard Haussman, Paris.
- EMILÉ MULLER, 19, Rue des Martyrs, Paris.
- PROF. GIACENTO PACCHIOTTI, Turin.
- C. SARODI, Ingegnere, Genoa.
- DR. PASSANT, 39, Rue de Grenelle, St. Germain, Paris.
- PROF. DR. JAETANUS PENI, Milan.
- DR. C. RICORD, 6, Rue de Bournon, Paris.
- HENRY ROGER, Président de l'Association des Médecins de France, 17 Boulevard de la Madeleine, Paris.
- PROF. DR. GEORGIO ROSTER, All'Institut, Florence.
- DR. CHARLES SAFFRAY, Secrétaire de la Société Française d'Hygiène, 19, Rue Gerande, Paris.
- DR. PROSPER DE PIÉTRA SANTA, Redacteur en Chef du Journal d'Hygiène 79, Boulevard de Courselles, Paris.
- LUIGI DEL SARTO, Direttore dell'Uffizio d'Arte Municipale, Florence.
- CAVALIERE EMILIO BIGNAMI SORMANI, Ingegnere de la Ville, Milan.
- LÉON TEMPLE, Montpellier.
- M. TRÉHYON, 71, Rue St. Anne, Paris.
- PROF. COMMENDATORE SALVATORE TOMMASI, Senatore, Regno d'Italia All'Università di Napoli, Italia.
- PROF. CAVALIERE MARINO TURCHI, All'Università di Napoli, Italia.



## FELLOWS.

Date of Election.

1881. Dec. ADAMS, G. E. D'Arcy, M.D., S.SC. CERT. CAMB., 1, *Clifton Gardens, Maida Vale, W.*
1880. May. AITKEN, PROF. William, M.D., F.R.S., *Woolston, near Southampton.*
1880. Dec. ANGELL, Lewis, M.INST.C.E., *Town Hall, Stratford, E.*
1880. Dec. BARTLETT, GEN., J.P., *Exmouth, Devon.*
1878. Dec. BARTLETT, H. Critchett, PH.D., F.C.S., 39, *Duke Street, Grosvenor Square, W.*
1879. Jan. BASS, Hamar, M.P., *Burton-on-Trent.*
1878. Dec. BELL, C. W., J.P., D.L., *Bramblehurst, East Grinstead, Sussex.*
1878. Dec. BRABAZON, RT. HON. LORD, 83, *Lancaster Gate, Hyde Park.*
1880. Jan. BRAYE, RT. HON. LORD, 40, *Grosvenor Street, London, and Stanford Sard, Rugby.*
1878. Dec. BRIGHTEN, W. G., 4, *Bishopsgate Street Without, E.C.*
1881. Nov. BROWNING, Benjamin, L.R.C.P., M.R.C.S., F.C.S., S.SC. CERT. CAMB., 70, *Union Road, Rotherhithe.*
1878. Dec. BURBERY, J. Stone, *Beatrice Villa, Lorne Road, Southsea, Hants.*
1878. Dec. BURDETT, Henry C., F.S.S., 39, *Gloucester Road, Regent's Sark, N.W.*
1882. Feb. BURGESS, Peter, M.A., M.B., *Commercial Bank of Scotland, Wishaw, Lanarkshire, N.B.*
1878. Dec. CAREW, R. R., *Carpenders, Watford, Herts.*
1880. Feb. CARPENTER, Alfred, M.D. LOND., M.R.C.S., S.SC. CERT. CAMB., *Duppas House, Croydon.*
1878. Dec. CARTER, R. Brudenell, F.R.C.S., 69, *Wimpole Street, Cavendish Square, W.*
1878. Dec. CHADWICK, Edwin, C.B., *Park Cottage, East Sheen, Mortlake, S.W.*
1880. July. CHILDS, CAPT. James, *The Terrace, Clapham Common.*
1878. Dec. CLARK, Daniel, *Carlisle.*
1881. July. COLES, William R. E., 44, *Berners Street, Oxford Street, W.*

1880. Dec. COLLINS, H. H., F.R.I.B.A., 5, *Randolph Road, W.*
1878. Dec. COLMAN, J. J., M.P., *Carrow House, Norwich.*
1878. Dec. CORFIELD, PROF. W. H., M.A., M.D. OXON., F.R.C.P. LOND., 10, *Bolton Row, Mayfair, W.*
1881. May. DAVEY, Alexander George, M.D., L.R.C.P., M.R.C.S., 9, *Belvedere Street, Ryde, Isle of Wight.*
1878. Dec. DE CHAUMONT, PROF. F. S. B. F., M.D., F.R.S., *Woolston Lawn, Southampton.*
1878. Dec. DENISON, A., 6, *Albermarle Street, W.*
1878. Dec. DOULTON, Henry, *Lambeth.*
1878. Dec. DREWRY, G. Overend, M.D., 57, *Queen Anne Street, W.*
1878. Dec. DYKE, T. J., F.R.C.S., *The Hollies, Merthyr Tydfil.*
1878. Dec. EASSIE, William, C.E., F.L.S., F.G.S., 11, *Argyll Street, Regent Street, W.*
1881. Oct. EATON, John, M.D., *Orchard House, Cleator Moor, Cumberland.*
1880. Apr. ELLIS, W. Horton, F.M.S., *Hartwell House, Exeter.*
1878. Dec. EVANS, T. W., *Allestree Hall, Derby.*
1878. Dec. FIELD, Rogers, B.A., M.INST.C.E., 5, *Cannon Row, Westminster, S.W.*
1879. Jan. FORTESCUE, RT. HON. EARL, 20, *Charles Street, Berkeley Sq., London ; and Castle Hill, South Molton, Devon.*
1878. Dec. GALTON, CAPT. Douglas, R.E., C.B., D.C.L., F.R.S., 12, *Chester Street, Grosvenor Place, S.W.*
1878. Dec. GILCHRIST, J., M.D., *Crichton House, Dumfries.*
1880. July. GRANTHAM, R. B., M.INST.C.E., 22, *Whitehall Place, London, S.W.*
1878. Dec. GRIFFITHS, E. F. G. ASSOC.M.INST.C.E., 18, *Abingdon Street, S.W.*
1880. Jan. GRIMSHAW, Thomas Wrigley, M.D., *Priorsland, Carrickmines, Dublin.*
1878. Dec. HARKER, J., M.D., *King Street, Lancaster.*
1881. May. HARRIS, Thomas, F.R.I.B.A., 20, *High Holborn, W.C.*
1879. Feb. HAVILAND, A., M.R.C.S.
1880. Apr. HIME, Thomas Whiteside, A.B., M.B., L.R.C.S., 217, *Glossop Road, Sheffield.*
1881. May. HODSON, George, ASSOC.M.INST.C.E., *Town Hall, Loughborough.*
1878. Dec. HOWARD, James, *Clapham Park, Bedfordshire.*
1878. Dec. JONES, LIEUT.-COL., V.C., ASSOC.M.INST.C.E., *Hafod-y-wern Farm, Wrexham.*

1878. Dec. LEAF, Charles J., F.L.S., F.S.A., *Pain's Hill, Cobham, Surrey.*
1878. Dec. LEAF, W., *Pain's Hill, Cobham, Surrey.*
1878. Dec. LIVESEY, J., M.INST.C.E., 9, *Victoria Chambers, Westminster, S.W.*
1878. Dec. LONGSTAFF, G. B., M.B., M.A., CERT. PREV. MED., *Southfield Grange, Wandsworth, S.W.*
1878. Dec. LUBBOCK, SIR John, BART., D.C.L., F.R.S., *Lombard Street, E.C.*
1878. Dec. MACKEY, John Alexander Dixie, *Christ Church, Oxford.*
1878. Dec. MARSH, Lory, M.D., *Greenhithe, Kent.*
1878. Dec. MASON, J., J.P., *Lynsham Hall, Witney, Oxford.*
1879. Feb. MOFFAT, T., M.D., F.R.G.S., *Hawarden, Flint.*
1878. Dec. MOLYNEUX, HON. Francis G., *Earl's Court, Tunbridge Wells.*
1880. Dec. NORTHCOTE, RT. HON. SIR STAFFORD, *Carlton Club, and Pynes House, Exeter.*
1878. Dec. NORTHUMBERLAND, HIS GRACE THE DUKE OF, D.C.L., LL.D., 2, *Grosvenor Place, S.W.*
1878. Dec. OHREN, Magnus, ASSOC.M.INST.C.E., F.C.S., *Lower Sydenham.*
1878. Dec. OLLARD, J. F., *Lloyds, E.C.*
1878. Dec. OLLARD, William Ludlam, *Musticott House, Walsoken, Wisbeach.*
1878. Dec. PAGET, J., J.P., *Stuffynwood, Mansfield.*
1880. Dec. PEGGS, J. Wallace, ASSOC.M.INST.C.E., 21, *Queen Anne's Gate, S.W.*
1878. Dec. RICHARDSON, Benjamin Ward, M.D., LL.D., F.R.S., 25, *Manchester Square, W.*
1878. Dec. RICHARDSON, J., M.INST.C.E., *Methley Park, Leeds.*
1881. Jan. ROBBINS, W. Morgan, 107, *High Street, Ilfracombe.*
1881. Oct. ROBINS, Edward Cooksworthy, F.S.A., F.R.I.B.A., 14, *John Street, Adelphi.*
1882. May. ROBINSON, Henry, PROF. M.INST.C.E., 7, *Westminster Chambers, S.W.*
1878. Dec. RUSSELL, HON. F. A. R., *Pembroke Lodge, Richmond Park.*
1878. Dec. RUSSELL, James A., M.A., M.B., B.SC., *Canaan Lane, Woodville, Edinburgh.*
1878. Dec. SALT, Thomas, M.P., 85, *St. George's Square, S.W.*
1878. Dec. SCOTT, MAJ.-GEN. H. Y. D. Scott, R.E., C.B., F.R.S., *Ealing.*

1881. Nov. SMITH, William Robert, M.D., F.R.S.E., F.C.S., S.SC. CERT. CAMB., 15, *Imperial Square, Cheltenham.*
1880. Jan. SNELL, H. SAXON, F.R.I.B.A., 22, *Southampton Buildings, W.C.*
1878. Dec. STEPHENS, Henry C., F.C.S., *Avenue House, Finchley.*
1879. July. SYMONS, G. J., F.R.S., 62, *Camden Square, N.W.*
1880. Dec. TEMPLE, RIGHT REV. Frederick, D.D., LORD BISHOP OF EXETER, *The Palace, Exeter.*
1880. June. THOMPSON, John, M.D., F.R.C.S., J.P., *Lynton House, Bideford.*
1878. Dec. TURBERVILL. COL. T. Picton, *Ewenney Priory, Bridgend, Glamorgan.*
1878. Dec. TURNER, Ernest, F.R.I.B.A., 246, *Regent Street, W.*
1879. Aug. URE, J., LORD PROVOST OF GLASGOW, *Helensburgh, N.B.*
1881. June. VARLEY, Cromwell F., F.R.S., M.INST.C.E., *Cromwell House, Beawley Heath.*
1880. Dec. WARING, COL. G. E., JUN., C.E., *Newport, Rhode Island, U. S. America.*
1882. Feb. WHITELEGGE, Benjamin Arthur, B. SC., M.D., S.SC.CERT. CAM., *Knutsford, Cheshire.*
1879. Jan. WILSON, George, M.A., M.D., 23, *Claremont Road, Leamington.*
1878. Dec. WYATT-EDGELL, REV. E., B.A., 40, *Grosvenor Street, W.*

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## MEMBERS.

### \* Life Members.

1876. July. ADAMSON, Daniel, *Dunkinfield, near Manchester.*
1879. Dec. ADDIS, William Judson, C.E., M.S.A., R.A.S., *Prome, British Burmah.*
1882. July. ALCOCK, Samuel, *Sunderland.*
1877. Mar. ALLEN, Henry Robert, *North Street, Hackney, E.*
1882. July. ANDREW, CAPT. C. W., 286, *Kennington Park Road, S.E.*
1876. July. ANNINGSOON, Bushell, M.A., M.D., *Cambridge.*
1876. July. ATKINS, F. H., 62, *Fleet Street, E.C.*
1878. July. ATWOOL, J., *War Office, Whitehall, S.W.*
1878. July. BAKER, R., *Ballingdon House, Green Lanes, N.*
1876. .... BALL, F., 18, *Bell Street, Henley-on-Thames.*
1878. Jan. BANNER, E. G., 11, *Billiter Square, E.C.*



1876. July. BARBER, Samuel J., *Eastwood, Notts.*
1877. .... BARROW, B., F.R.C.S., J.P., *Southlands, Ryde, Isle of Wight.*
1879. Dec. BARR, William Alexander, M.D., M.R.C.S., 45, *Abington Street, Northampton.*
1877. July. BARRY, J. G., 8, *Old Jewry, E.C.*
1882. Jan. BARTLETT, Robert V. O., 1, *St. John's Place, Newport, Isle of Wight, and Brixton, S.W.*
1878. Oct. BAUGH, Alfred Charles, C.E., 3, *Temple Row, Wrexham.*
1877. .... BEARD, Neville, *The Mount, Ashbourne.*
1876. July. BELL, Thomas, L.R.C.P. LOND., *Uppingham, Rutland.*
1878. Oct. BEMROSE, Henry H., *Lonsdale Hill, Uttoweter Road, Derby.*
1877. .... BENNET, J. Henry, M.D., *The Ferns, Weybridge.*
1877. July. BENNETT, Hugh, M.R.C.S., *Builth Wells, Brecon.*
1876. July. BERESFORD, Robert, M.D., *Oswestry, Salop.*
1876. July. BEST, Frederick A., M.R.C.S., *Church Hill, Walthamstow.*
1878. July. BICKERSTETH, E. R., F.R.C.S., 2, *Rodney Street, Liverpool.*
1878. Oct. BINDLEY, CAPT., *Burton-on-Trent.*
1881. June. BINDON, William J. Vereker, D.SC. PUB. HEALTH EDIN., M.D., *Appins, West End Lane, Hampstead.*
1878. Sept. BIRCH, R. W. Peregrine, M.INST.C.E., 2, *Westminster Chambers, S.W.*
1877. Sept. BIRD, Peter Hinckes, F.R.C.S., S.SC. CERT. CAMB., 1, *Norfolk Square, W.*
1881. Nov. \*BOND, Frederick Adolphus, M.B., C.M. EDIN., S.SC. CERT. EDIN., *Brinklow, Coventry.*
1877. .... BOSTEL, D. T., 19, *Duke Street, Brighton.*
1878. Oct. BOSTOCK, H., *The Oaklands, Rowley Avenue, Stafford.*
1880. Nov. \*BOULNOIS, H. Percy, M.INST.C.E., 2, *Mount Radford Crescent, Exeter.*
1877. Oct. BOWER, Thomas, *Lytham, Lancashire.*
1876. July. BRETT, A. T., M.D., *Watford House, Herts.*
1877. .... BREWER, G. B.
1881. Jan. BROOKS, James, F.R.I.B.A., 35, *Wellington Street, Strand.*
1876. July. BROWN, P., M.D., *Blaydon House, Blaydon-on-Tyne.*
1876. .... BURNS, R. Scott, C.E., *Oak Lea, Edgeley Road, Stockport.*
1876. Aug. BURNEY, G., *Millwall Docks, E.*
1881. Nov. BURTON, Robert Graves, M.D. EDIN., L.R.C.S. EDIN., *Hanwell, W.*

1880. Dec. \*BURTON, W. Kinninmond, 1, *Adam Street, Adelphi, W.C.*
1878. Oct. BUTLER, G. J., *Shrewsbury.*
1876. Aug. CARLINE, John, ASSOC.M.INST.C.E., *Lewisham Board of Works, S.E.*
1882. Jan. CARRITT, Ernest, 4, *Lime Street Square, E.C.*
1876. July. CARTER, W. Allan, 5, *St. Andrew's Square, Edinburgh.*
1878. Oct. CHAMPION, A. J.
1881. May. CHESTON, Horace, A.R.I.B.A., 1, *Great Winchester Street, London, E.C.*
1881. Oct. CHILD, Edwin, M.R.C.S., *Vernham, New Malden, Kingston-on-Thames.*
1880. Jan. COLLINGRIDGE, W., M.R.C.S., M.A., M.B., S.SC. CERT. CAMB., *Port of London Sanitary Offices, Greenwich.*
1878. Sept. COLLINS, W., 3, *Park Terrace, East Glasgow.*
1876. .... COLLINS, W. J., M.D., 1, *Albert Terrace, N.W.*
1877. .... COOTE, T., *Oaklands, St. Ives, Hunts.*
1878. Sept. CORBETT, J., 24, *Barton Arcade, Manchester.*
1877. .... CROOKES, W., F.R.S., 7, *Kensington Park Gardens, W.*
1877. Sept. CROWLEY, Frederick Ashdell, *Alton, Hants.*
1877. Oct. DAVIES, Hugh, 1, *Hill Street, Wrexham.*
1881. Oct. DAY, Ernest, 5, *Foregate Street, Worcester.*
1878. Sept. DELAHUNTY, James, *Waterford.*
1878. May. DENNIS, W., M.INST.C.E., 3, *Victoria Street, Westminster.*
1877. July. DODD, J., 6, *Thomas Street, Liverpool.*
1878. Oct. DOUGLAS, George, *Burslem.*
1877. .... DOULTON, James D., *Lambeth, S.W.*
1876. Dec. DOWSON, A., ASSOC.M.INST.C.E., 3, *Great Queen Street, Westminster, S.W.*
1877. Aug. DYER, F., 66, *High Street, Camden Town, N.W.*
1877. Aug. EBURY, RT. HON. LORD, *Manor Park, Rickmansworth.*
1877. .... ELLIOT, Robert, M.D., F.R.C.P. LOND., J.P., 35, *Lowther Street, Carlisle.*
1877. Aug. EVANS, R., *Water Works Office, Chepstow.*
1881. Dec. FARR, Archer, L.R.C.P. EDIN., L.M., L.F.P. S. GLASG., L.S.A. & S.SC. CERT. EDIN., 37, *Queen Street, E.C., and 370, Coldharbour Lane, Loughboro Park, S.W.*
1876. .... FARR, William, C.B., M.D., D.C.L., F.R.S., 78, *Portsmouth Road, Maida Vale, W.*
1878. June. FORSHAW, Edward, *Bank Chambers, Hanley.*

1879. Dec. \*FOSTER, Reginald Le Neve, F.C.S., *North Road, Droylston, Manchester.*
1878. July. FRY, Miss C. A., *St. Catherine's, Oxford.*
1878. .... GENTLES, Thomas Lawrie, L.F.P.S. GLASG., *Wellington House, Derby.*
1878. June. GILL, D., *Farleigh, Weston-super-Mare.*
1877. Oct. GREEN, Joseph, *Union Street, North Shields.*
1878. Oct. GRIFFITHS, Robert, *County Surveyor, Stafford.*
1878. July. GRIFFITHS, Thomas, *Silverdale, Oxton, Birkenhead.*
1878. Mar. GRIGGS, R., 11, *Gray's Inn Square, W.C.*
1877. Aug. HAMILTON, SIR, R. N. C., K.C.B., *Avon Cliffe, Stratford-on-Avon.*
1881. June. HAMMOND, Frederick, 2, *Coleman Street Buildings, Moorgate Street, E.C.*
1876. July. HARKER, THE REV. W.
1880. Nov. \*HARLAND, A., 70, *Stanhope Street, N.W.*
1882. June. HARRIS, Alfred E., L.R.C.S., L.R.C.P., *M.O.H., Sunderland.*
1877. Sept. HARRISON, C., M.D., S.SC. CERT. CAMB., *Newland, Lincoln.*
1882. June. HARRISSON, Thomas Harnett, ASSOC.M.INST.C.E., 21, *Harrington Street, Liverpool.*
1876. July. HARTLEY, R., L.R.C.P. EDIN., *Pemberton, Wigan, Lancashire.*
1878. May. HOLT, H. P., ASSOC.M.INST.C.E., F.G.S., *Fairlea, Palatine Road, Didsbury, Manchester, and 5 Westminster Chambers, S.W.*
1878. July. HOOKER, J., F.C.S., 104, *Upper Thames Street, E.C.*
1877. July. HOOPER, Rev. R. P., M.A., F.R.G.S., 31, *Cambridge Road, Hove, Brighton.*
1877. Mar. HOWARD, E., 84, *Upper Whitecross Street, E.C.*
1882. June. \*HUBBER, Frank, *George Street, Exeter.*
1878. Mar. HUMPHREY, PROF. G. M., M.D., F.R.S., *Cambridge.*
1878. June. HUSBAND, H. Aubrey, M.R.C.S., 27, *Chalmers Street, Edinburgh.*
1878. Sept. HYDE, Samuel, M.R.C.S., *Clifford Lodge, Buxton.*
1877. June. ILIFFE, W., M.R.C.S., *Hartington Street, Derby.*
1878. Sept. INGILBY, SIR Henry D., BART., 9, *Hereford Gardens, Park Lane, W.*
1882. July. JONES, John Watkin, *Maesyyffynon, Tonalaw, near Pont-y-pridd, South Wales.*
1878. .... KEMPSON,
1877. .... LAKE, W. C., M.D., *Teignmouth, Devon.*

1876. July. LATHAM, Baldwin, M.INST.C.E., F.M.S., F.G.S., 7, *Westminster Chambers, S.W.*
1878. May. LAW, Henry, M.INST.C.E., 5, *Queen Anne's Gate, S.W.*
1877. .... LAWS, J., *Blyth, Northumberland.*
1878. July. LAWSON, R., *Lansdowne Road, Notting Hill.*
1877. Oct. LAYTON, Thomas, *Kew Bridge, Middlesex.*
1878. Oct. LEE, John, *Church Street, Ashbourne.*
1876. July. LE GRAND, A., 100, *Bunhill Row, E.C.*
1878. Oct. LEMON, James, M.INST.C.E., F.R.I.B.A., *Lansdowne House, Southampton.*
1877. .... LEON, George I., 79, *Gloucester Place, Portman Square.*
1881. Dec. LEONARD, Hugh, 7, *Hanover Square, W.*
1878. .... LEVESON, E. J., *Cluny, Sydenham Hill.*
1880. Dec. \*LINGARD, J. Edward, ASSOC.M.INST.C.E., *Rodney Chambers, Derby.*
1877. July. LLOYD, Thomas, *The Square, Winchester.*
1877. Apr. LUSH, John Alfred, M.D., M.R.C.P. LOND., *Salisbury.*
1882. Apr. LYTE, F. Maxwell, F.C.S., F.I.C., *Union Club, Trafalgar Square.*
1878. July. McARTHUR, A., M.P., *Raleigh Hall, Brixton Rise.*
1879. July. MACFARLANE, Walter, *Saracen Foundry, and 22, Park Circus, Glasgow.*
1878. Nov. MACKEY, John B., 2, *Bouverie Street, Fleet Street, E.C.*
1878. Oct. MACLAGAN, James McGrigor, M.D., *Riding-Mill-on-Tyne, Northumberland.*
1878. May. MANSERGH, James, M.INST.C.E., 3, *Westminster Chambers, Victoria Street, S.W.*
1878. Oct. MARTEN, H. J., M.INST.C.E., *The Birches, Codsall, Wolverhampton.*
1878. Sept. MARTIN, J. M., C.E., *Castle Chambers, Exeter.*
1880. July. MATHESON.
1878. Sept. MASON, Hugh H., M.R.C.S., *Abby Lodge, Barking.*
1876. .... MEGGET, A., 7, *Huntris Row, Scarborough.*
1878. .... MEIKLEJOHN, J., *Dalkeith, N.B.*
1877. Oct. MELISSENO, G. C. A., Melisurgo, ASSOC.M.INST.C.E., *Palazzo Cocozzo, 76, Via Poerio, Naples.*
1878. Sept. MILLER, John Faure, M.D., 28, *Rue de Matignon, Faubourg St. Honoré, Paris.*
1877. .... MILNER, I.
1878. June. MOORE, J. H., *St. Michael's Lodge, Bournemouth.*



1879. Feb. \*MOSELEY, George, F.R.C.S., *Breadalbane Lodge, Spencer Road, Eastbourne.*
1882. Apr. NANSON, Thomas, 9, *Park Crescent, Stockwell Park Road, S.E.*
1877. Sept. NELSON, E. M., *Hanger Hill House, Ealing.*
1877. Sept. NELSON, George H., *The Lawn, Warwick.*
1878. Sept. NICHOLS, G. B., C.E., *Handsworth, Birmingham.*
1876. July. NIXON, Charles J., *Addiscombe, Cranborne Road, Bournemouth.*
1878. May. NORMAN, W. S., 13, *Warwick Road, W.*
1877. Sept. OGLE, William, M.A., M.D., F.R.C.P., *The Elms, Duffield Road, Derby.*
1881. Mar. \*PAGE, Herbert Markant, S.SC. CERT. CAMB., M.R.C.S., 16, *Prospect Hill, Redditch.*
1877. .... PAGLIARDINI, T., 75, *Upper Berkeley Street, Portman Square, W.*
1878. May. PARKER, J., *Woodstock.*
1877. .... PARKER, W. C., M.INST.C.E., *Whitehall Club, S.W.*
1878. .... PATTINSON, S., *Ruskington, Sleaford, Lincoln.*
1877. June. PEEL, Edmund, *Brynfys Ruabon, North Wales.*
1882. Jan. PERRY, Henry Robert, A.R.I.B.A., *Oak Cottage, Western Bank, Derby.*
1881. June. PERRY, John Tavenor, A.R.I.B.A., 9, *John Street, Adelphi.*
1879. Dec. \*POWELL, George Thompson, *Rotherwood, Sydenham Hill, and 11, Pancras Lane, E.C.*
1877. .... \*POWELL, J., 10, *St. George's Crescent, Liverpool.*
1879. July. PRALL, Samuel, M.D., *West Malling.*
1878. June. PRITCHARD, E., C.E., F.G.S., 27, *Great George Street, Westminster, S.W.*
1877. .... PRITCHETT, G. E., F.S.A., 20, *Spring Gardens, S.W., and Oak Hall, Bishop's Stortford.*
1877. Aug. PULLIN, T. H. S., M.D., *Sidmouth.*
1877. Sept. RAE, Robert, 337, *Strand, W.C.*
1881. Jan. RAINGER, Charles Henry, 9, *Bath Place, Cheltenham.*
1876. July. REDWOOD, T. Hall, M.D., *The Lawn, Rhymney.*
1881. June. REED, Frederick H., A.R.I.B.A., 10, *Belmont Hill, Lee, S.E.*
1878. Oct. RICHARDS, E. M., ASSOC.M.INST.C.E., *Town Hall, Leamington.*
1878. Oct. RICHARDSON, R.,
1878. Oct. RUSSELL, J. B., M.D., *Medical Officer of Health, Glasgow.*
1878. July. SANDYS, MAJOR M., 87, *Jermyn Street, S.W.*

1881. July. SCHMIDT, E. W. C. F., A.R.I.B.A., *Eastbourne, Sussex.*
1876. Oct. SHAFTESBURY, RT. HON. EARL OF, K.G., 24, *Grosvenor Square, W.*
1878. June. SHIPWAY, J. H.
1876. July. SHONE, Isaac, ASSOC.M.INST.C.E., *Wrexham.*
1878. Oct. SHRIMPTON, Charles, M.D. PARIS, 11, *Willswood Park, Torquay.*
1877. .... SILLAR, W. C., *St. James' Lodge, Kidbrooke Park Road, Blackheath, S.E.*
1878. Nov. SKRINE, Henry Duncan, *Claverton Manor, Bath.*
1877. .... SLADE-KING, Edwyn, M.D., LIC. IN STATE MED., R.C.P. EDIN., *Croft Side, Ilfracombe.*
1877. June. SMITH, R. W., *Mount Rundell Harborne, Birmingham.*
1877. May. SMITH, W. R., *Clifton House, Clifton-by-Ashbourne, Derbyshire.*
1878. Oct. SPRUCE, Samuel, *Beech House, Tamworth.*
1878. July. STAINTHORPE, W. Waters, M.D., S.SC. CERT. EDIN., *Kirkleatham, Redcar.*
1876. July. STIFF, E., *London Pottery, Lambeth.*
1876. July. SUTCLIFFE, R., 100, *Bunhill Row, E.C.*
1877. Sept. SWETE, Horace, M.D., S.SC. CERT. CAMB., F.C.S., *The Grove, Worcester.*
1880. Jan. \*SYKES, J. F. J., B.SC. PUB. HEALTH, M.B., L.R.C.P., M.R.C.S., 7, *Thayer Street, Manchester Square.*
1876. Oct. TAYLOR, John W., M.D., D.SC., *Rothsay House, Scarborough.*
1881. Nov. TAYLOR, Shepherd T., M.B. LOND., L.R.C.P., M.R.C.S., *Grove House, Norwich.*
1877. .... TEMPLETOWN, GEN. RIGHT HON. VISCOUNT, K.C.B., 49, *Charles Street, Berkeley Square.*
1878. July. THOMAS, W. Cave, 53, *Welbeck Street, W.*
1878. .... THOMPSON, James, A.B., M.D., M.R.C.S., 1, *Matheson Road, West Kensington.*
1878. .... THORNLEY, J. E. Lyndon, *Bickenhill near Birmingham.*
1878. Oct. TROTTER, Arthur E. H., *Stockton-on-Tees.*
1879. July. TYLOR, William Alfred, 2, *Newgate Street, E.C.*
1882. July. VIGERS, Edward, A.R.I.B.A., F.S.I., 38, *Parliament Street, S.W., and 79, Elyin Road, Paddington.*
1877. June. WALKER, J. H., L.R.C.P. EDIN., *Pickering, Yorkshire.*
1877. Sept. WALLER, Thomas, 47, *Fish Street Hill, E.C.*
1881. May. WEBB, Phillip, 1, *Raymond Buildings, Gray's Inn, W.C.*
1878. Oct. WELFORD, J., 4, *Warwick Place, Paddington, W.*

1880. May. WHITE, William, F.S.A., F.R.I.B.A., 30A, *Wimpole St., W.*  
 1877. Sept. WHITWILL, Mark, *Redland House, Durdham Park, Bristol.*  
 1878. July. WILKINSON, William, *Town Hall, Salford.*  
 1881. July. \*WITHERS, J. B. Mitchell, F.R.I.B.A., 5, *Surrey Street, Sheffield.*  
 1882. July. \*WITTS, J. W., *Market Harborough.*  
 1877. Sept. WOOD, Jacob, M.P.S., 186, *Highbury Park, N.*  
 1882. Jan. WORSNOP, Frederick, 48, *Westfield Road, Burley Road, Leeds.*  
 1878. Sept. \*YUILL, W., ASSOC.M.INST.C.E., 3, *Fenchurch Avenue, E.C.*
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\* Life Associates.

1881. May. BAMLETT, Adam Carlisle, *Thirsk, Yorkshire.*  
 1882. June. \*BAXTER, John, 2, *Walnut Tree Walk, Kennington Road, S.E.*  
 1879. Dec. \*BLAKE, Edward Thomas, M.D., 47, *Seymour Street, Hyde Park, W.*  
 1879. Aug. BOLDING, John T., 19, *South Moulton Street, W.*  
 1879. Nov. \*CLARKE, A. Lennox, *Union Buildings, Selly Oak, King's Norton.*  
 1882. Mar. DENSHAM, Charles A., 55, *Cochrane Street, St. John's Wood.*  
 1880. Feb. EMPTAGE, Daniel, *Dane Hill Sanitary Works, Margate.*  
 1881. Nov. \*HORROCKS, Joseph.  
 1882. Feb. KENNINGTON, Thomas, 47, *Colmore Row, Birmingham.*  
 1880. Feb. KINSEY, W. Barns, *Hop Exchange, Southwark, S.E.*  
 1879. Nov. \*LAPWORTH, J., *Vestry Hall, Bethnal Green, E.*  
 1882. July. \*LIGHTFOOT, Thomas, 3, *Trevor Square, Knightsbridge.*  
 1881. Nov. \*RAINS, Joseph, *Kettering.*  
 1881. Nov. \*SORTWELL, W., 9, *Retreat Place, Paragon Road, Hackney, E.*  
 1882. June. \*STEERS, George, *Wellington Street, Bedford.*  
 1881. June. \*WILKINSON, W., *Parson's Lane, Bury.*

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1879. Oct. ANGELL, A. Torrington, 144, *Fulham Road, S.W.*  
 1879. Oct. BATTEN, MAJ.-GEN. S. J., 14, *Notting Hill Square.*  
 1879. Sept. BOURNE, Stephen, *Atherley, Wallington, Surrey.*  
 1879. .... COBHAM, George R., *Gravesend.*  
 1879. June. COLES, Cowper, C.B., 2, *Albany, Piccadilly.*  
 1879. Apr. DENHAM, W. Hempson, F.L.S., F.S.S., *Southsea.*  
 1881. Jan. DIXON, Joshua, *Winslade, Exeter.*  
 1880. .... DOMENICHETTI, Richard, M.D., *Trinity Lodge, Louth.*  
*Lincolnshire.*  
 1877. Sept. FLEETWOOD, The Local Board of.  
 1879. Mar. GOODALL, Abraham, F.R.C.S., F.R.G.S., INSP. - GENL.,  
 4, *Elvaston Place, Queen's Gate.*  
 1879. June. HALL, Alexander Lyons, F.R.G.S., *Lyons Court, Ladbroke*  
*Road, W., and Lyons Court, co. Antrim, Ireland.*  
 1879. Oct. JENNKINS, B., 37, *Outram Road, Croydon.*  
 1879. Sept. JEWEL, J.  
 1877. .... LADIES SANITARY ASSOCIATION, 22, *Berners Street,*  
*Oxford Street, W.*  
 1879. .... MIDDLETON, Reginald E., ASSOC.M.INST.C.E., 5, *West-*  
*minster Chambers, S.W.*  
 1879. Sept. \*PRATT, M., *Brigstock House, Thornton Heath, Croydon.*  
 1877. .... RIVERS PURIFICATION ASSOCIATION, 232, *Gresham*  
*House, E.C.*  
 1878. Oct. SOUTHPORT, The Mayor and Corporation of.  
 1880. .... STEPHENSON, F. C., *Hill House, Little Heath, Charlton,*  
*S.E.*  
 1877. Sept. TOTTENHAM SANITARY ASSOCIATION, *High Cross,*  
*Tottenham.*  
 1879. Feb. WALLACE, Miss, 6, *Hyde Park Gardens.*
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APPENDIX.



PAPERS READ

AT

ORDINARY MEETINGS OF THE INSTITUTE,

AND DISCUSSIONS THEREUPON.



# ON THE LAW IN RELATION TO SANITARY PROGRESS.

BY W. H. MICHAEL, Q.C., F.C.S.

*Read February 9th, 1881.\**

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IN the Ancient Temples of Japan wheels hang suspended from the walls, to which are attached copies of the sacred writings. These wheels, as an act of devotion, are turned round by the obedient and adoring worshippers of the Buddha Sakia Moune, in accordance with his divine command, "Make the wheel of the law turn." A similar labour is performed by those wishing to be learned in the law, but who, having no time or inclination to master the eight written books of divinely communicated wisdom, cause a ponderous book-case containing these scriptures to revolve on its pivot, and this, often enough repeated, is accounted to them as the knowledge of the incomprehensible.

"The intention is accounted as valuable as the act."

Are we entirely free from such devices in the execution of our laws, and in the practices of "how not to do it" of our local parliaments and local executive? Is the statement true which was made by a speaker claiming authority at a recent sanitary meeting, that out of 70,000 houses built annually in London, 50,000 are unfit for human habitation? And further, this has been commented upon by a leading London newspaper as being a disgrace to the Local Government Board.

It is not easy to determine whether the acquaintance of the speaker and the writer with the facts and law of the case are equal; but it is a strange, though true, commentary upon both that the Local Government Board has no voice in, or control over, the sanitary regulation of the metropolis.

By what at least to outsiders seemed to be a strange turn of the wheel of the Law, the Metropolis was altogether excluded from the operation of the Public Health Act, 1875, to which every other portion of England and Wales was made subject. One would often like to say "a truce to definitions," but in the present condition of sanitary science and sanitary action this is

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\* The discussion occupied part of the evening of February 9th, and the whole of the evening of March 9th.

neither practicable nor desirable. And this at least is an instance in which the meaning of "uninhabitable" should be clearly explained, in order to take some action on a state of things which, if it has in any degree foundation in fact, reflects infinite discredit on the local government of the various sections of the Metropolis. Without in any way reflecting on the authority of the speaker, it may be urged, considering the present temper of the public mind, that unless provided with the most exact and thorough statistical and scientific information, it behoves those who wish for enlarged sanitary power and extended sanitary action to exercise the greatest self-restraint and care; and direct proof should not only be forthcoming, but at the time adduced and appended to every statement of alleged shortcomings of authorities in the execution of the Sanitary Acts. The objects of these Acts when shortly stated are: to provide for us in our houses and streets, dry subsoil, fresh air, and pure water. To obtain these desiderata is no easy task, not so much from inherent obstacles, as from those which we have ourselves created by faulty action or continued neglect, surrounding us on every hand with complications and impediments which defy complete enumeration. The natural impatience of taxation is intensified when the taxpayer is called on to pay his hardly earned monies to procure assumed benefits he has not yet learned to appreciate at their proper worth, and with respect to which he entertains strong doubts whether work undertaken for his alleged protection will be succeeded by results at all worth their cost.

This is so important a factor in considering the law with respect to future action, that it may be explicitly stated from ample experience, that permissive legislation in sanitary matters is something worse than useless. Health is to be provided for the ratepayer, and especially for the neighbour of the ratepayer, without his consent, first asked and obtained, and by slow but successive stages all our legislation is becoming modelled on this principle: although we are not without warnings that old mistakes are only waiting the opportunity again to assert themselves. Still it must not be forgotten, as a leading principle, that no laws having to deal with the person as such, can hope to be thoroughly successful in action if their provisions extend far beyond the education and convictions of the general public. It is true that the law should be somewhat in advance of popular belief, for laws should themselves educate by their teachings and sanctions; but if pushed too far they provoke, as in the past they have often done, although themselves entirely in accord with the principle of utility, so violent an opposition, as to defeat their proper objects, and thus throw back on the dial of progress a long continuing shadow of revolt and inaction.



Of this we are the witnesses on the great subject of sanitary progress, and we have been the sufferers, with those we most earnestly wish to protect. In view of the difficulties which beset the question, we might well despair, were it not that our greatest successes have been the outcome of our greatest defeats, from which we have learned both how to labour and how to wait.

To reform the laws, to ensure the adoption of more stringent provisions for improving the public health, we must be content with much less of advance than we know to be useful, and we must be prepared, not only for the glory of conflict with what is hurtful and pernicious, but for the much more difficult task of patient waiting and laborious drudgery to get our opinions adopted, and to ensure the enactment of laws, for the necessity of which we have been long convinced, and for which we believe there is forthcoming overwhelming proof.

Our legislators, after the most searching, and long continued enquiry, conducted by the most competent and painstaking enquirers in all countries, have been at last satisfied that one of the most loathsome diseases, and one of the direst scourges that ever afflicted humanity, is controlled exactly in proportion as the operation of vaccination is well and thoroughly performed among the population. That those nations where it is compulsory on the whole population, and where the law is enforced with the greatest care and precision, that there the disease is almost obliterated. That in exact proportion to this care and precision in various communities is the amount of immunity; that this immunity commences exactly at the age, whether three, six, or twelve months, when, in the several countries, the performance on the infant of the protective act becomes imperative; that large bodies of men aggregated together, in different localities, of differing nationalities, but under similar sanitary conditions, except in the particular of vaccination, differed in their mortality from small-pox, almost identically in proportion as the use of the prophylactic was enforcible and enforced by authority, while the mortality from other diseases of epidemic or endemic character, such as dysentery, cholera, or typhoid fever, followed the usual laws of suffering from neglect of sanitary precautions, and that while the deaths from small-pox were in proportion to the absence of vaccination, an entirely different ratio was observed in the mortality from other preventible diseases.

Since this protective agency has been discovered and used, doctors and nurses can attend hundreds and thousands of cases of the most virulent character without themselves being sufferers.

A careful and exhaustive enquiry into cases of alleged injury from vaccination show that less than 50 out of more than three

million cases of performance of the operation investigated, were really proved, which now, with the improved knowledge and means at our disposal, can never recur; and the direful roll of death and deformity from its beginning to its end, demonstrates that the ratio of deaths continually decreases as the unvaccinated give place to those upon whom the operation has been successfully performed, and these further diminish in exact proportion as the scars left by it show that it had been more or less carefully and efficiently carried out.

As a result of these proven facts, the law makes vaccination compulsory, or rather it imposes, and now happily continues to reimpose a fine upon those who disobey its behests. But should it not go further? and when consecutive fines show the obstinacy of the parents or guardians against complying with the provisions of the law, should it not, in the interests of Society, by its own officers, provide for obedience, by itself undertaking the operation, and thus securing the protection?

But this it is alleged is an unwarrantable interference with the liberty of the subject; to which I have only to reply, that the sooner the subject is deprived of the liberty to spread misery, disease and death among an innocent and helpless community, the better for all classes of her Majesty's subjects. This instance of compulsory application of law to the person to protect the public may have for its pendant a proposed application of the same principle to property, in order, if possible, to draw a broad line of demarcation between what should and what should not be compulsory, and also to lay down the rules which, in the opinion of the writer, should determine the question in all cases of acknowledged public injury: 1st, there should be certainty as to the cause of the injury; 2nd, certainty as to the efficiency of the proposed remedy; and 3rd, that the remedy is productive of no evil effects, and may advantageously be adopted. At the commencement of the present winter season we were assured that the prevalence of London fogs was constantly on the increase, both as to frequency and severity, owing to the ever-increasing volumes of smoke sent into the atmosphere of the Metropolis from houses, hotels, clubs, manufactories, and the like, and it was urged that the time had come for passing a law not only compelling every house to consume its own smoke, but rendering imperative the use of gas as a heating medium, or the adoption of Anthracite or some other of the class of smokeless coals for general domestic use. By the speeches and writings of public men, by the action of societies, much attention has of late been called to the question as one of urgent importance, and as one affecting public health and public property.

But whether the presiding genius of fogs was alarmed at the array of talent and energy brought to bear against his missives, or whether, to save us from a blunder, it has fortunately happened that spite of cold, frost, snow, and other sad visitations, the months when London is most usually visited have been singularly and most exceptionally free from dense fogs, and, with the exception of the frost of the past month, the winter of the year was as bright and delightful as that of its predecessor, 1879, was dismal and dark, and certainly as fine a one as with our climate we can ever expect to enjoy. This at once disposed of the allegation that fogs are altogether dependant on the presence of smoke over which we have control, and that as this last increases as the cause, so the result inevitably follows, in augmentation of the number and severity of fogs, such serious troublers of our rest, comfort and cleanliness.

The aqueous particles which make up London fogs, with their envelopes of dust and hydrocarbons require no smoke to put on their very densest and yellowest of mantles; and dust created by the consumption of gas and perfectly invisible, or from any other sources of heat, or the thousand and one producers of dirt and dust in our great metropolis are factors equal in production to the very densest smoke from the most frequented and fashionable of our Club-houses. Here our sources of certainty, authorizing compulsory application of prescribed remedies, entirely break down, and we further know that places far removed from the alleged causes of complaint, and without them in fact, and where the operation of the proposed remedy would be nil, suffer equally with ourselves from the infliction of ills inherent to our physiological condition.

There are two causes always in action, and always tending to undermine and to break down either insidiously and indirectly, or directly and suddenly, the public health.

The first of these is defective sanitary condition of our dwellings, either defects of primary construction, or defects of care and continued attention to healthful conditions; and the second depends either on waves of malarious influence, the creators of algide and other fevers, or upon the communication of infectious diseases from person to person, from neglect of isolation of such cases of illness. Whatever may be the nature of malaria, whether germ or ferment, with their sources in dismal swamps of vast extent, reeking with masses of decaying vegetable and animal matter, with these we cannot now, if we can ever, hope to contend. But this we can do, we can build up in every individual, by following sanitary teachings, a wall of resistance, a fort to resist attack, and this is the first care of sanitary science. It seeks to remove from the dwelling all accumulations



of filth, and so to ensure that there shall be within or without the dwelling no nidus in which these diseases, although never self-originated, may yet develope and spread, and further to sweep away all the conditions favourable to their existence—for only when such conditions exist can they create disease. If it were not so, if men were not, as they now are, endowed either naturally or by attention to sanitary regulation of their houses and of themselves, with varying powers of resistance, all would fall alike victims to an epidemic of cholera, or scarlet fever, or dysentery; but the fact is, that it is only those whose powers of defence are, from whatever cause, reduced below the force of the attack, who fall victims to the onslaught. The law helps the defence by creating, or striving to create, conditions which drive away all traitors from the camp, agencies tending to reduce the *vis vitæ* of the combatants. It is because it has not effectually done so in the past that we have so often to reap a sad harvest of suffering and death. General legislation before 1848, when the first public Health Act became law, was practically nil, and even then it was to a large extent permissible, so far as the statute law was concerned, for large communities by every inhabitant to poison the air, not only of his own dwelling, but that of his neighbours, by foul emanations from receptacles or gouts of filth, and other sources of insalubrity.

Ten years after this came the Local Government Act of 1858, but no sanitary action was compulsory upon any authority until the Sanitary Act of 1866; and this Act, although amended year by year, was found to be practically unworkable, because, to use a sporting phrase, the fishing was with too long a line—the rod being held by the Local Government Board in London, with a line of command expected not only to control, but to capture the enemy, and make him a tractable and working slave in Northumberland. Then, after the labours of the Sanitary Commission, came the Public Health Act, 1872, which divided the whole country into sanitary districts, with varying powers, as these districts were called urban or rural. By the first Public Health Act of 1848, it was provided that the Act might be adopted by the ratepayers of any district after certain preliminaries. In many cases it was so adopted for the express purpose of avoiding the necessity of doing anything or spending a single penny in furtherance of its provisions. Once the Act had been adopted, and the district was free from contribution to the Highway Board of the district. The Local Boards were elected, and never met for the dispatch of business. This necessitated the passing of another Act, limiting the adoption of the Public Health Act to districts which contained at least a certain minimum number of inhabitants, except with the consent



of the Local Government Board. Then came another Act, allowing small districts, called special drainage districts, to be carved out of large ones—a special provision for inaction and misrule.

When the Public Health Act, 1872, swept away sewerage and special drainage districts, and divided the whole country into urban and rural districts, a large portion of all the urban districts were rural, and of the rural districts urban; so that rural districts, often consisting of large villages as large as the urban towns, were left without control over the highways, and without any power to make bye-laws regulating buildings or streets or roads. From this state of things has grown up an aggravated insanitary condition, continually getting worse, creating some of the greatest difficulties to be to-day contended with by the arm of sanitary progress. On the outskirts of populous and prosperous urban districts manufacturers, to avoid control and the payment of rates,—borough and general district rates,—have set up their works, quickly to become surrounded by a teeming population, denser than the very towns to which they have become suburbs. Here, without control and without the pretence of sanitary supervision, everyone has hunted his own hare and has built his house in accordance with his own whim and will, and in many cases with the most utter contempt for sanitary precautions. Thus it happens, that one side of a street in these districts is urban and is stringently governed upon the most approved principles, and the other, the rural—well the least said of it the soonest mended, but everyone conversant with these matters knows the scenes to be met with in such localities, the description of which seem like the grossest exaggeration in a civilized country pretending to advanced progress.

What a farce is sanitary protection under such circumstances, as though disease and death would be arrested on their way to take note of the arbitrary divisions of districts created by the greed of wealth, and maintained because their removal would entail monetary burdens on self interest in exchange for benefit to others. Every day's delay in providing a remedy, makes it, when obtained, the more costly and difficult of application, unless some great calamity like the fire of London, shall come to remove these precursors of plague. But, however far away in the provinces may be these centres of disease, we are here in the metropolis, all deeply interested in their removal, for in sanitary matters what is local is general—not merely as affecting national prosperity, but as influencing in a greater or less degree the health and safety of every member of the community.

Are we to allow this state of things to go on increasing, as it is daily doing, with only such protest as is to be seen by the introduction into Parliament every Session of three or four private Bills, by which the Municipal authorities of boroughs strive to extend their boundaries, in order to include and lay under rule these recognized sources of injury. But nothing is more difficult than to secure the success of such attempts at private legislation—opposed always on the score of the entailed additional pecuniary burden which they involve, for committees of both Houses of the Legislature are most unwilling to impose burdens on property, especially when these should be in conformity with general instead of patch-work and piece-meal legislation. It is much to be regretted that before the passing of the Act of 1875, which consolidated into itself all existing legislation, a Commission had not been appointed to enquire into the difficulties which had been met with by sanitary authorities in carrying into effect the provisions of the Act of 1872, and also what were the boundaries of districts that should be determined on in the case of each sanitary authority. It is firmly believed such a Commission would have recommended that the distinction between rural and urban sanitary districts and authorities should be removed. For if we are to judge by experience, these have been productive of little else than difficulty and confusion in the working of the Sanitary Acts.

In lieu of splitting up districts and dividing duties and responsibilities, it is suggested that what is urgently required, both with regard to efficiency and economy, is how to ascertain in each county what should be the limits for municipal purposes within which one local authority should exercise all powers of poor relief, education, town government, sanitary supervision, and all other such local functions under one taxing authority. Sufficient elasticity might be provided for all inequalities of town and country, houses and lands, by making the amount of rating depend upon the benefits conferred, and modifying the stringency of the law in view of the conditions existing or required. There are wider limits than these within which experience has taught us powers must be exercised, and for these, and in order to secure other advantages resulting from the establishment of a strong intermediate authority between local bodies and a central direction, county-boards are required. To such authorities, consisting of the chairman of the board of each several local district within the control of the county, with the addition of an element of representation from the magistracy, might well be entrusted those compulsory powers which already exist for enforcing due sanitary provision in every district, to enquire into and report upon the applications of local authorities for powers to acquire land for

the disposal of sewage, to report upon joint works, and in certain cases to carry them out, to manage county institutions and finance, and to act as an appellate authority in conflicts occurring between local boards and their constituents; cases in which the presence of a board of high authority and clothed with quasi-judicial functions would be of immense advantage.

To such a county authority should also be entrusted the conservation of river basins and the powers of a water trust. It is discouraging to witness again this session the introduction of a measure for a river conservancy on the old lines of optional adoption, proposing to create a new authority with arbitrary districts. Either we are without sufficient information to enable a general measure of protection against floods and conservation of rivers for the good of the whole land to be passed by Parliament, in which case we should at once strive to obtain the required knowledge; or, if we are in possession of adequate information, every year's delay makes the difficulty of dealing with the question more embarrassing by allowing further private interests to grow up and further complicate a question already beset with enormous difficulties—not the least of which is the appropriation of water by districts or individuals entirely independent of their own appropriate water-shed areas and proper areas of supply. There are no words with which we can measure the importance of this question, both as to the domestic and manufacturing use of water.

To these must be added the further great question of injury from floods, making us suffer equally from too much and too little of Nature's greatest boon. It is sufficient to condemn the partial character of the present measure that the greatest of our rivers—the Thames—and the one most urgently calling for treatment, is to be excluded from the operation of the Bill. But we want to know more about water—more as to the subterranean stores which may be utilised, and much more as to the best measures for storing what we have already ascertained to be at hand for use, but which now becomes a curse instead of a blessing. We must recognise the fact, however much we may agitate for cheap supplies of water to our town populations, that the rich in this case must pay for the poor, that no restrictions, as in the case of gas, can be put on its fullest use, and whether in the metropolis or elsewhere we shall be forced to the adoption of general rating by a public body, to meet the cost instead of payment for quantity used. This will make the use of the provided public supply quasi-compulsory, for the payment will follow, whether the water be used or not, with relief in certain cases on the basis of the exemptions in the Public Health Act, and those now observed in the incidence of



the Inhabited House Duty. If, indeed, public health is public wealth, the importance of its conservation should have greater recognition in the machinery of the state, and its proper estimation should be enforced by the creation of a ministry of health charged with the supervision of all sanitary authorities, not merely as a controlling body to regulate expenditure, but to afford help and encouragement when required, and by its influence and character to smooth over the daily obstacles which are inevitable, if local authorities are to act up to the spirit of the law, even as it now is, without taking into account popular prejudice against further extensions of compulsory provisions.

What then is most required is the reconstitution of authorities, so that powers already granted may be better used for the good of the public, rather than the increase of the powers themselves; in almost all cases these in the hands of such authorities will be found adequate, but it is not so in every particular. If opportunity offer, we crush beneath the heel of our boot the head of any venomous reptile that may come in our way, to prevent injury to ourselves as well as to others; we should hardly think of exciting the beast by the toe of a dress shoe, to sting us to our death. Yet how do we deal at the present time with cases of infectious diseases occurring in our midst, one of the great sources of danger to the public health which we can easily stamp out, but which we deliberately allow to run on its course unmolested. If a member of our own family should unhappily be laid up with an attack of measles or scarlet fever, we, as soon as it is known, become isolated and cut off from our social belongings. Our friends no longer call upon us, we are prevented from going into society, and our acquaintances when they meet us rein up their horses at a safe distance from the curb of the pavement on which we stand, while they enquire as to the sanitary condition of our little home community. At the same time these very friends and acquaintances in shops or warehouses which they frequent or use, in laundries, and in workshops, are daily shaking hands with infection, and dealing directly with persons who come straight from their habitations, where infectious disease is present, and who in their clothes, and otherwise convey to the unsuspecting, the matters which engender disease. The tailor who makes or mends our coat does so in the company of measles or small-pox; the laundress, who is busy with the garments soon to be applied as coverings to those we love best, bestows her care equally on the snowy surface of our linen, and on the scarlet desquamating skin of her child, and then we wonder at the spread of infectious disease, and that so little good results from sanitary measures, as though sewer and ventilating apparatus outside our houses were all the protection that is required to



ward off disease, and that the interiors, and all that there occurs, is beyond the need of our attention and our laws.

We have the means at hand effectually to stamp out infectious disease at its first approach. Already private legislation has in several towns gone far ahead of any general provisions of the law for the public safety, and in these towns it is obligatory on the householder under penalties to give the earliest information to the medical officer of health of the occurrence in his house or premises of any case of infectious disease. There is, however, more than this required, and it will sooner or later, spite of sentimental outcry, be adopted in the isolation of cases of infectious disease in special hospitals under carefully considered conditions, where the treatment of cases can be best carried on, and the subsequent convalescents placed under the most favourable conditions for perfect recovery. This will be done primarily in the interests of the healthy as against the sick, but with an equal amount of benefit to the sufferers themselves, and to their relatives and friends. Such a system efficiently carried out would in a limited period add five years to the mean duration of life in this country. And who is there here who can sum up in figures the amount of suffering and misery which is represented in the five years thus cut off from the short span of human existence?

At present sanitary authorities require teaching equally with their constituents. Let us do what we can to instruct them. But those of us who are most urgent for improved law as an agent in sanitary progress are the first to recognise the truth—that all external law will be useless, unless every man in his own sphere, and specially in his own house, becomes a law to himself.

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After Mr. MICHAEL, Q.C., had read his Paper, the following discussion ensued, Dr. RICHARDSON, F.R.S., occupying the Chair:—

THE CHAIRMAN: The importance of this paper is such that, in discussing the matter, you must keep in mind the three great questions which Mr. Michael has brought forward. He says, before you admit anything in the way of legislation of a sanitary kind you must have an absolute knowledge that that which is going to be done will be a success. Next, he says, there should be in country districts an intermediate body between the local body and the central Government body. The third point he urges is that there should be a reconstitution of the authorities rather than new powers conferred on the existing bodies. Finally, he suggests in a very clear and able way this point, whether, after all, legislation is really wanted for the *summum bonum* of sanitary science, in respect of which every man

should be a law unto himself. If these points are borne in mind I think the discussion will go on as smoothly and merrily as a marriage bell.

MR. H. C. STEPHENS, F.C.S., said he rather gathered that the author of the paper proposed that they should endeavour to do without legislation altogether, or to aim at that, and certainly, according to the last paragraph of the paper, under certain circumstances, this might be desirable. His object in rising was, however, to point out how the law instead of aiding sanitary progress contrives to obstruct and thwart it. There was no question upon which the mind of the country was exercised more than upon the question of the disposal of sewage, and opinion was now pretty generally settled that the rainfall should go into the natural water-courses of the country, and that the sewage proper should be treated so that the solid matters which it contained in suspension and solution should be separated from the water: but instead of the law assisting the sanitary authorities to do this, the law itself presented an insurmountable obstruction to the working of any honest and regular system of sewage purification. By the 15th and 21st sections of the Public Health Act. all sanitary authorities are required to admit roof-water and surplus subsoil water into their systems of sewers; so that, instead of having a constant regular volume of sewage they had a volume of sewage most irregular in quantity, sometimes enormously swollen by a heavy rainfall, which could only be disposed of by what was known as the storm overflow, a back door which was opened not only on legitimate occasions but on illegitimate also. On show days, when some taking system of separation or purification was to be seen in operation, and when it was desirable to put on the best appearances, the system was exhibited in attractive and successful operation. But if a surprise visit were made it would be found, whether there had been a rainfall or not, that most frequently this back door was still open, and the sewage was allowed, under cover of the supposed working of a sewage purification process, to pollute the natural water-courses of the country. Of course it was very difficult to deal with such a state of things as this. He submitted that in consequence of this obstruction by the law there was a general system of make-believe all over the country as to the purification of sewage, and while it was supposed the sewage was being purified the real facts were very different to the generally prevailing impression. The great difficulty was that the local authority had very little power or option, and instead of carrying on the work on a level with the engineering and sanitary intelligence of the present day it had to carry out a rude and out-of-date method, by providing large outlets to admit roof-drainage and subsoil water, the very large and irregular flow of which had to be provided for to the complete destruction of any proper system of sewerage. Another matter in which the law really obstructs instead of aiding the sanitary progress of the country was with reference to the water supply. He lived in a district which was supplied by a public company with hard water. This

company had taken possession, under the powers of an Act of Parliament, of a very large rural district which was now passing into an urban sanitary district, in which it was generally admitted that a great depreciation of property resulted from the character of the water supplied, and it was unfortunately the case that, from the nature of the water, boilers and machinery and the pipes in the course of a few months became choked, and they had to be removed at a great expense. To render this state of things more bitter the inhabitants had very near to them a water company which supplied its own district with good artificially-softened water, and had every condition for giving his district a far better service than the hard water company. His district was compelled to take the hard water only because the law insisted upon their submitting to it, just in the same way as before the French Revolution people, instead of dealing with whom they pleased, were compelled to go round the corner and deal with some particular baker, butcher, or other tradesman. It was, however, the fact that the inhabitants of his district could not get this softened water—which was one of the best waters in the country, it was the Colne Valley water—yet they could not have it, but were obliged to submit, and by the operation of the law were compelled to take this hard water and see the value of their property disappearing, besides having to submit to the greatest possible inconvenience and discomfort. That was certainly a great sanitary disadvantage, inflicted upon his district by the operation of the existing law. He submitted that the first thing requiring attention was to do away with the retarding and obstructing influences of the law, and this aspect of the question certainly merited attention before they considered how the law could promote sanitary progress. The country was now under a popular Government and under institutions becoming every day more free, and it was said that the law could be an educator of the people, but it was evident that those who made the laws still required to be very considerably educated.

MR. CUNNINGHAM GLEN, Q.C., was struck by one very remarkable omission in the able paper which had been read. When medical men met together, he had heard them speak with reverence of men who were the pioneers of medical science—of Harvey, Simpson, and many others, but he had not heard in the paper any mention made of the name of the discoverer of sanitary science. That name had been forgotten—he referred to Dr. Southwood Smith, who was the discoverer of sanitary science, so called. In his (Mr. Glen's) younger days he remembered him as the Physician of the Fever Hospital at King's Cross, now at Islington. From the experience he there gathered from the patients who from the surrounding district and outlying localities were sent to the hospital, he formed the conclusion that there were large classes of disease which he described as preventible diseases, the recurrence of which, by the adoption of sanitary means, would be brought under control. He laid down his views on that subject in a work which he published in 1834 or 1835, which was



now scarcely to be met with. After Dr. Southwood Smith's book had attracted some interest, the matter remained dormant, and no further action was taken upon the matter until 1844 or 1845. At that time Mr. Chadwick, having been relieved from his more active duties under the Poor Law Commission, took up the subject which had been broached by Dr. Southwood Smith, and he and his fellow sanitary reformers published the result of the enquiries compiled from answers to various questions he had put, and the information obtained from medical men who had been examined on the question. This book was published, and caused a great sensation both in England and Scotland at the time. After the publication of that book the first sanitary legislation took place, but it was only of a temporary character, to endure to the end of the then next Session of Parliament, that is, for one year only. That Act was known as "The Nuisances Removal Act." It was a short Act, which was found to work very well indeed. It was in fact an enabling Act for certain local authorities to do certain things in the way of removing nuisances considered injurious to health. In the year 1848 the Act was renewed with amendments, and made permanent by the 11 & 12 Vict., c. 123, which again became by re-enactment the 18 & 19 Vict., c. 121, which is still in force in the metropolis, though repealed beyond the limits of the metropolis. Then followed the expiration of the power of the Poor Law Commissioners, and Mr. Chadwick not being re-appointed to his former office on the Poor Law Board; the Board of Health was constituted, when Mr. Chadwick, Dr. Southwood Smith, and Lord Ashley were appointed Commissioners to carry out the objects desired. That state of things continued, notwithstanding many blunders, until the year 1858, when the Local Government Act was passed, the effect of which was that first Sir Benjamin Hall, then Mr. Chadwick, and Mr. Tom Taylor carried on this business for a long time. They all knew how the matter now stood. All the former legislation was repealed, and everything placed under the direction of the Local Government Board. The duty of that Board was to hold local enquiries in places where loans for district purposes were needed, or, with the assistance of a medical officer, into the causes of diseases prevailing in certain localities; but as to any compulsory powers they had, or might have, he should be very sorry to see them extensively acted upon. There was one instance in which the compulsory power was acted upon nominally by the Secretary of State, but really by Mr. Tom Taylor, and frightful was the effect. In a place not far from the Metropolis he acted upon his compulsory powers and appointed an engineer to carry out certain sanitary works, who entered into the matter helter-skelter, and to carry out what he thought was necessary for the purpose, laid out a new system of drainage, sewerage, new waterworks, a sewage farm—in fact, almost everything conceivable to sanitary science. Mr. Taylor thereby involved the local authorities to such an extent that they had to mortgage their rates up to the very hilt. He (the speaker) would be very sorry to see the compulsory powers of the Board often put in force. He should be very chary in acting



upon such a power, and taking it out of the hands of the local authority and placing it in the hands of a central authority. Speaking as a vestryman, he should be very sorry to see the Local Government Board exercise such powers. He had had a great deal of experience throughout the country, and for the last ten or twelve years especially in Kensington, and he must say that, although taking part in the management of that parish, it was one of the best sanitarially managed parishes in the kingdom. The manner in which the Medical Officer (Dr. Dudfield) and inspectors performed their duties was most excellent, and as far as local administration was concerned the parish of Kensington could not be improved. He did not know that any other points occurred to him, but with reference to sanitary science itself he was not disposed to go in for all the measures advocated by the promoters of sanitary science. He had very great respect for soap and water, the scrubbing brush, and a full meal. Those were the best sanitary appliances he knew of. With regard to drainage, he did not go against natural drainage. The Almighty had provided for that in the rivers which were the natural drainage of the land, but they must not be allowed to silt up with the pollution of sewage matter. A stop must put to that, and if that were done, a great point would be gained. He would further draw attention to the fact that during one year upwards of twenty millions of money had been sunk in the execution of sanitary works without the ratepayers, who had to meet the expenditure, having any effective control over the expenditure. It was not of course in one year alone, but year after year those sums had been expended. He remembered a sanitary engineer coming to him for advice in reference to carrying out some sanitary works. He (Mr. Glen) ventured to question the merits of the proposed operation, upon which the engineer explained the scheme; he (Mr. Glen) pointed out that it violated or disregarded some important sanitary principles. The engineer in answer said, "I perfectly agree with you,"—but the contract for the works was £85,000, and he was to have a commission of 5 per cent. upon it, and that, no doubt, was a sufficient answer on his part to the question whether the project was worth carrying out or not. With regard to the River Thames, he would just add that the present system of sewage was not by any means perfect. It had already done much mischief lower down the river, and sooner or later, he had been told by an eminent engineer, the river itself would become most seriously foul, unless a better system of sewerage was adopted. It was only a question of time, but he thought the present scheme was a gigantic blunder, and that it was quite clear that they must not neglect to keep in a sanitary and wholesome condition the rivers of the country which were the Almighty's natural drains.

MR. FOOKS, Q.C., said if he understood the paper aright, the view of the author was not so much that power which now existed, or the law as it now stood was defective, but that so far as sanitary regulations were concerned, though some extension of power, or possibly

some limitation of power was wanted, the powers which now existed could and should be more wisely and efficiently wielded. It appeared to him that that was the object of the paper, in which, if so, he entirely concurred. It was obvious to all that we had a central body and that we had local bodies armed with optional and discretionary powers, which might be—he would not say that they were not—sometimes tyrannically and injudiciously wielded, and they were often exercised, not so much for the advancement of the public welfare, and the improvement and promotion of the public health, as might be desirable. As practical men, they should address themselves to that evil. It appeared to him that the evil existed in giving too much latitude of action, without sufficient restraint, to the local bodies upon whom it devolved to carry out these sanitary laws. We had sanitary authorities in the shape of Local Boards all through the country, whose powers were exercised by a variety of officials, sometimes assisted by the scientific engineer, down to the overseer of the parish assisted by nobody—who had almost absolute power to order what should be done and what remedies should be applied to sanitary defects. He was satisfied from his experience as a country resident that if the powers of dealing with such measures were vested in Justices of the Peace, acting as magistrates in Petty Sessions, or as members of County Boards, it would amount to simply nothing. In large communities and towns the men who had to carry out such measures had too much rather than too little discretionary power. The smaller class of cottage property and larger houses let out in flats, were, in too many instances, overcrowded dwellings, and the fertile source of disease. As long as there were people who had but little clothing to wear, little food, and not the means of paying much for house accommodation, no matter what is was, they would rather live in cellars than have nothing over their heads. We, assembled here, would of course like every man to be well housed, well fed, and well clothed—that was going further than the mere sanitary view of the case—those however who had but poor lodging, little to eat, and but little clothing, would at all events, with such clothing as they had, and such food as they could acquire the means of paying for, content themselves with any lodging they could acquire in any houses in which they could get shelter. The people who made incomes, getting 10, 15, or 20 per cent. for their investments, by letting out small cottages and the buildings he had referred to, had to a great extent the governing power and the control of the rates, and were as a rule, opposed to any important sanitary improvements which would entail expense. The remedy, as it appeared to him to be applied to this state of things, was to strengthen somewhat the hands of the executive, by having a County or other District Board or authority interposed between the Government Board and the Local Bodies, with a controlling power over the latter. This was a point to which the late government and the government of the present day had to some extent already had their attention directed. The public however might assist by saying, “These things shall exist no more. You must have an effective control over those local bodies who will not put the

sanitary laws in force and check their vexatious and capricious exercise." For instance, if a gentleman wanted to put a bay window to his house, or to do something to increase the light and air to his own dwelling, without any detriment to the public, the cry is, "Oh! it is against the law to do that." He (the speaker) could say that within the last few years the courts were engaged in deciding such a question. In that case there was a street 100 feet broad, with gardens in front, and because the fronts of the houses were the building line, a gentleman who put out a bay window, was subjected to a long and useless litigation. There was too much of that sort of Bumbledom—a great deal too much. It required a strong hand applied to see that proper sanitary measures were carried out, and also to prevent arbitrary powers being carried to foolish extremities. With reference both to urban as well as rural authorities, and especially the overseers, it was a fact, that the men most active and influential in office were the owners of, and let out, cottages or dwellings which had not the common conditions and accommodation for decent people. That state of things would never be rectified unless authorities were appointed, with a district appointed to each, with the power to say, "This must be done, this must not be done, and this must be carried out. If you don't carry it out yourselves, it will nevertheless be done at your expense." The main points to which attention should be directed were the overcrowding of houses, insufficient sewerage, and bad water. They could never get effective sewerage introduced into some towns because it would increase the rates, falling chiefly upon mere occupying tenants forming the sanitary authority, and not upon the landlords, whose property would be permanently improved by it. There was a growing competition for land for building tenements and houses, and those who ought to fulfil the obligations which attached to such property, evaded them. If rates were levied upon property in towns for the permanent benefit of the inhabitants, why should not the permanent owner rather than the casual occupier have to pay for the benefit. As between town and country, as well as between landlord and tenant, there was a conflict of interest, under the existing law, which did militate practically against carrying out improvements that ought to take place, both in reference to sewerage and water supply. This was recognised as a great obstacle why sanitary improvements were not carried out, and the water supply was bad because of defective sewerage, which led to the pollution of streams. His friend Mr. Glen had said that the natural streams were one of God's great gifts to us, but appeared to think that the gift should be utilised more generally as the means of carrying away sewage. He (Mr. Fooks) granted that in some special cases streams might be converted into sewers, but as a general rule the prevention of the pollution of streams ought to occupy public attention above all things, and next to that the prevention of floods and the recurrence of drought, if that were possible, also demanded public attention. Generally, however, he fully agreed with the view so ably put forward by Mr. Glen with reference to the treatment of sewage and the question of water supply. As to the proper supply of water



he was quite satisfied that before a local board could be brought to adopt the sound principles of water supply, they must be very much more enlightened than they were at present. He had himself had some connection with waterworks companies, and with public and corporate bodies, and he had found that the latter really wanted water supplied to them at such a price as would not be remunerative to the company who supplied it; nay, more than that, they wanted to have water and sewerage provided in such a way that they could make a little profit out of it. Both sewerage and water supply were too often regarded by local authorities as things from which they might get a commercial profit. In his (Mr. Fooks's) opinion the public health was the first question to be considered, in comparison with which the commercial view of making profit was nothing, and that the obligation of providing efficient sewerage and a supply of pure water wherever needed should attach to landlords rather than to occupying tenants, and that whether as regards the incidence of the obligation, or the remedies for compelling its fulfilment, the law was in fault and required amendment. He thought the views propounded in the paper read by his friend, Mr. Michael, were most sound; and, in conclusion, he would say that although the present laws were not altogether satisfactory, still they were a step in the right direction. The laws, however, were not so much to blame as the mode in which they were carried out. They were, in fact, in advance of public sentiment and views, and the members of the association dealing practically with this important subject should seek to improve the public mind, and through them the legislature, in order to get the existing laws sufficiently supplemented. With these observations he concluded by earnestly supporting the views expressed in the paper which had been read, namely, that further legislation was required, not so much for obtaining more or larger powers, but for more effectually wielding and putting in force those powers that already existed.

MR. WYNTER BLYTH had not intended to address the meeting, but having heard the excellent paper of Mr. Michael, and having been engaged many years in sanitary science and experiments in sanitary science, he had much pleasure in supporting the general ideas enunciated in that paper. He would confine his remarks to the distinction between urban powers and rural powers, which he had always found in his six years' experience as a medical officer in Devonshire, was very injurious to the proper working and carrying out of the present sanitary law. He could instance many difficulties which arose in consequence of that absurd distinction between urban sanitary powers and rural sanitary powers. He would like to have one certain law, equally regulating alike those urban and rural powers. There was an instance in his own locality of a ruinous building, propped up by a few posts, which had become positively dangerous to passers by, and yet, because he had not urban powers he could not condemn that building, and it was allowed to stand or fall as the case might be. In one or two instances life had been nearly lost by the fall of chimneys,



houses, or other dangerous structures. Many people in his district had had narrow escapes from being killed by such occurrences. With regard to the reconstitution of the present sanitary authorities he was quite in accord with Mr. Michael's views. Some of the rural authorities in his district were very quiet authorities indeed. As an instance of the ability of rural authorities in postponing matters of improvement that might be urgently wanted, he would give this instance. He wanted, for sanitary purposes, a drain put down in a certain locality, and the rural authorities agreed that it was very desirable, and even necessary. They were agreed as to that, but instead of directing the work to be done, it was adjourned to the next meeting of the Board. Well, at their next meeting, a resolution was passed—it was resolved that a committee should be appointed, and that that committee should visit the spot. Between that meeting and the next the committee visited and inspected the spot, after which the matter went over to the next meeting. At that meeting there was a great unanimity of opinion as to the necessity for this work to be carried out, but decisive action was deferred until another meeting, and many subsequent meetings, at each of which something or other cropped up which prevented the requisite order being given. That sort of process went on for six years, and he supposed, for aught he knew, was going on still. As he understood, Mr. Michael did not wish to interfere with local government, and thought that it was not desirable to have an imperial legislative power which should compel all local, urban, or rural authorities to act contrary to their own ideas. Now, he (Mr. Blyth) admired the principle of local government very much, but personally he would rather not have too much to do with Local Government Boards. He did not care to have a body of gentlemen possessing absolute power in London, and controlling the actions of those who were located in such distant places as Northumberland, Carlisle, and possibly on the remote hill-sides of Wales and Scotland. In many respects it was desirable that the regulation of sanitary measures should be confined to local authorities because they were cognisant of and dealt with local matters of detail, in which local knowledge was most material and useful. On the other hand, if for every little thing that was required to be carried out in a remote part of the country, it was necessary, before that could be done, to write to a gentleman, an officer, at Whitehall, for instance, and defer the work until after an answer was received from him, and perhaps a long correspondence would thereupon ensue, the locality would suffer from the red-tape system which every one knew was a great drawback and hindrance to urgent business. He observed that Mr. Michael wished to constitute a county area, or something of that kind, and that, speaking from his own experience, he thought would be of great use, even if it did not disturb the functions of the local authorities. The cases he had mentioned would illustrate his meaning. If a local authority, or a county authority neglected or refused to carry out those sanitary measures which were required, and a higher authority had the power to compel them to do it, or to do it for them, he thought that would be a very great advantage. He did not exactly understand what was

stated in the paper read to them as to areas, but he inferred that Mr. Michael wished the areas he suggested to coincide either with the water area, or conservancy of rivers, or with areas of localities, but he (Mr. Blyth) was quite sure that any area which did not coincide with the registration areas would be useless as regarded sanitary purposes. If that were not provided for, although a large amount of statistical particulars and information had been collected, all those statistics would have to be gone over again and corrected if the present areas were altered.

MR. C. N. CRESSWELL said, that although he only came to the meeting as a visitor, on the invitation of a friend, to hear Mr. Michael's paper, he had been called upon to say a few words with reference to a subject upon which he had exercised himself for some time. The Chairman had suggested, after the paper had been read by Mr. Michael, that there were four leading characteristics of that paper, and that the discussion should be confined to those four points, but he failed to see that, with the exception of the third speaker, Mr. Fooks, the discussion had been so confined. His friend, Mr. Glen, who was a great authority in sanitary law, went into a long discussion, and started theories which nearly made his (Mr. Cresswell's) hair stand on end, so contrary were they to what they had heard from other quarters; but he (the speaker) would content himself by saying that he disputed what Mr. Glen had said. Mr. Fooks had spoken on those subjects with which he was familiar from experience, and so also had the gentleman behind him (Mr. Blyth). One always listens with pleasure to gentlemen who gave the results of professional experience, in order to throw light upon such subjects in a manner that ought to be appreciated. With reference to the second point to which attention had been called, Mr. Michael had alluded to the importance of an intermediate authority being constituted as between the rural and the urban authorities and the central authority or Local Government Department in London, a board of which almost everybody could say much, but very little in its favour. It was, he thought, impossible to conceive a greater drag upon their progress in matters, upon the importance of which all were agreed, than that system of centralization which had grown up amongst them, without their having had even a vote in the appointment of those who have to put important measures in force. He recollected in his own district—a rural area with which he had been connected for some years—that the building of a pig-stye in connection with the union workhouse was found to be necessary; and to give one instance out of many in his past experience he would tell them that the government inspector had to be consulted on this important subject, and visited the workhouse, inspecting the place where the stye was proposed to be built. He expressed his opinion upon it, and then went home, and nothing further was done. Time passed, and his attention was again and again called to the matter, but still as his formal sanction was not given, the work was not done, and so far as he (the speaker) knew to this day the pig-stye had not been

constructed. In another case, a complaint was made as to the constituents of a plum pudding which had been given to the paupers in the union workhouse, it was supposed to be a matter far beyond the needs of the paupers, and a government inspector was actually sent down to discuss that important question. An enquiry was held, but the matter was at length settled by a benevolent lady saying that, to avoid any such difficulty in future, she would herself supply the plum pudding gratuitously. That might be thought a *reductio ad absurdum*, but it was a sample of the exercise of the powers and authority of the Local Government Board. Such authority was only really required in important matters; but as had been pointed out, there were also important but simple duties which could be wisely and better carried out by those who had local knowledge and applied it to local needs. There was at present more than enough experience of the ill-effects of Whitehall officers instructing the urban and rural authorities as to the best mode of discharging their duties. Then came the important question as to how far the central authority should have power to act. He would say let them act in cases where advice was sought by despairing local authorities, who would be only too glad to seek the help of those who should help them, but which, according to his experience, they were never willing to do. They had heard, upon the best authority, within the last few weeks, that the Government were about to try the experiment of County Boards in Ireland. He hoped it would not be said that that was an *experimentum in corpore vili*. It might be a benefit to Ireland, if it were applied stringently, but it was strange and anomalous that an experiment in sanitary progress should be tried first in a country which seemed at present to need legislation upon much more important matters. He thought it would have been far better to adopt the principle of establishing County Boards in England. They had been advocated and discussed, and urged by the Society of Arts, and arguments in favour of them addressed to the Government by the highest authorities in the scientific and sanitary world—arguments proving the great importance of such Boards, if properly carried out, to the agricultural and commercial interests of the country. This principle, he believed, would be found to be a remedy for many of the sufferings and heavy burdens under which they were at present labouring. He hoped all those who had at heart, and he believed they all had, the progress of sanitary science, would express their conviction that the real solution of the difficulties which had been so ably pointed out was to be found in this—the most important question of the day. At present, whenever a Board wished to borrow even one thousand pounds for a valuable sanitary improvement, they were obliged to apply to the Government Board for their approval before venturing to contract such a loan. That often implied a local enquiry, and an expensive and inconvenient correspondence, and much delay. In many instances of that kind the money had not only been forthcoming, but actually paid into the bankers before the inspector could find time to come down to make enquiry and report upon the matter. In several cases he had known urban and rural Boards, instead of



waiting for the visit of the inspector, think it worth while to incur responsibility, sometimes grave personal responsibility; and instead of waiting for that official, the Boards had, in many cases drawn a cheque for the amount required at their board-room table, and taken the responsibility upon themselves. He could mention many other instances where injury had been occasioned in consequence of defects in the Sanitary Acts, which could be supplied by these County Boards. The only question and only obstacle which stood in the way of establishing such Boards was the difficulty as to how they should be constituted—whether they should be composed of Justices of the Peace and gentlemen of position, with others of lower grade. Surely that was a question which could easily be solved. It might, by some be thought they should be truly local institutions, and he thought the Guardians of the Poor should be represented on the Board, which should also have educated men among its members. At all events a trial might be made. He could conceive that such boards might become a sort of local parliament which was by all means desirable. Such boards would be the means of moral and political education as well, and would enable many young men to fit themselves for higher work in a larger arena. They would elevate, educate, and to a great extent enable men to carry out the valuable principle of local self-government, and induce gentlemen to join in that work, by introducing them to men from whom they had formerly kept aloof. Although these Boards might combine some elements of incongruity they would have the effect of fitting men to discharge important duties, and he saw no reason why they should not combine all the valuable elements of local self-government. He could conceive these Boards acting as financial committees, both with regard to rural parishes and municipal boroughs. He could even conceive their acting as a judicial committee, as a part of local government and as a parliament of the county, combining within itself all the requisite attributes which would render it much easier to carry out important sanitary works of drainage, and waterworks. With reference to the pollution of rivers, he had recently heard that two very important Bills were intended to be brought before Parliament, one, “The Prevention of Floods Bill,” which had already been passed by the House of Lords, and was about to be referred to a Select Committee; the other was Mr. Magniac’s Bill, as to the pollution of rivers. He had carefully read these Bills, and they were entitled to much admiration for the care and accuracy with which they were drawn by experienced men. Curiously enough they were unanimous on one point with reference to conservancy boards, that these boards should be charged with the enforcement of the “Rivers Pollution Prevention Act, 1876.” Those who had observed the working of that Act knew that it was a lame and impotent piece of legislation, because no one had the power to put it in force. If it were necessary to bell the cat, everybody knew it was a difficult thing to do. With reference to the offences sought to be prevented by this Act, according to his experience in almost all cases, the principal delinquents were the owners of small cottage property. The members of local boards were elected by



voting papers, filled up by gentlemen who could read and write, (which was not always the case with the occupants of small cottages,) consequently these gentlemen nominated themselves or their friends, who were also owners of cottage property. Many of the inmates of cottages, as he knew, had much to complain of with regard to the state or surroundings of their dwellings. When he had advised a man to make a complaint of unsanitary matters, and to speak to the sanitary inspector, he said he did not want to mention it because it would offend his landlord. The man would not interfere because, perhaps, if he did, he would get into trouble with the landlord for causing the rates to be increased. That was patent to all. In one instance, when a man had been urged by the speaker to complain to his landlord of the bad state of his cottage, the instant reply was, "Do you think I should be such a fool? Why, there is not another cottage to be had about here, and if I spoke to my landlord he would turn me out." In fact, the real power in such matters was too often in the hands of the owners of cottage property. He knew an instance in which three-fourths of the members of the Board were small tenement owners and the greatest delinquents. Then with regard to pollution, when the men, who were engaged in manufacturing or other business, were asked to do what the law required to prevent that, what was their reply? It was in effect, "never," and too often they incorporated among themselves such powerful influences as to set the law at naught. It therefore became necessary to have an intermediate body with power to enforce the law—a body consisting of, not such men as too frequently constituted the sanitary authorities, but independent men far above suspicion, and who should firmly put into force an Act which the legislature thought necessary for the welfare of the country at large. Whenever that law was set in operation it was in a sort of interlocutory and circuitous manner. His experience was, that there had only been about four or five cases in which the Act had been attempted to be put in operation; never had it been put into effectual force. If there were an intermediate authority, the difficulties he had mentioned could be easily overcome, because the county board would stand in the position of a protector to the local medical practitioner, having superior power over the local authority and the local practitioner. By such means, people aggrieved by improper sanitary work or other defects would be able to get an order for their rectification, and the local authorities would be compelled to do their duty, even taking the Act as it stands, in reference to sanitary provisions. Turn to the Act for the prevention of floods, the latest production of the present government, and what was to be found in its clauses? Among them there was an exception and saving clause that it should not apply to the Thames—the river which Englishmen maintain to be the largest and finest port in the world. That was to be excepted from the operation of the Act. For what reason? It might be said because it was already under the control of the Thames Conservancy Board; but people living in the Thames Valley knew well that no river demands instant legislation more than the Thames. It

was just as if a Bill were brought into Parliament—a Bill to alter or increase the power of an already existing law, but excepting from its jurisdiction every man who was rated to the poor, *i.e.*, the majority of the population.

MR. G. J. SYMONS, F.R.S., said he would not have risen to speak on a merely legal question, but it was not merely a legal question put before them. Having no connection with the law, he would nevertheless say there was one point on which the last speaker had raised considerable doubt in his mind, that was in reference to the establishment of County Boards. He would not attempt to indicate what their powers ought to be, but if their jurisdiction was to follow the existing lines of county boundaries, he feared the effect would be that they would cut some of the most important watersheds in half, in one or two places. He would infinitely prefer, if possible, that all areas should be well and sensibly defined. At present the registration districts, and indeed all districts, were of a most arbitrary and, in some instances, of an absurd character. Not only counties, but small towns and little villages, were in some instances divided in a most anomalous way. He knew that the Registration districts and boundaries had been established ever since 1837, and it was a very serious thing even to suggest an alteration of those boundaries, but any one who had studied the reports of the Registrar-General since 1837, must have noticed that considerable alterations had been made. He thought he was within the mark in saying that modifications to the extent of 200 or 300, of one sort or another, were necessary. He was not prepared to say that even such an occurrence as a disastrous fire was as serious an evil as generally considered, for they were the means of consuming and sweeping away sometimes large unhealthy districts which were far better cleansed. A remark had been made by Mr. Michael as to the great fire of London being a calamity—he (the speaker) was not so sure of that. No doubt it was a calamity to many of the poor people who got their livelihood in London and were burned out—to them it really was one. But considering what London was before and what it became after the fire, although they might think that as a fire it was a calamity, so far as the rebuilding of London was concerned it was the reverse, as it swept away a great many most confined and unsanitary parts and divisions in the city, and resulted in as much benefit as counter-balanced the inconvenience and distress caused by that fire. With respect to the question of the pollution of rivers, he remembered some time ago hearing a remark by an important official declaring that after a heavy rain in Northamptonshire it was twenty-three days before the river in the district could carry off the superabundant water. The idea that twenty-three days were necessary or required for that river to perform its proper function of carrying off the surface water from the land showed that it was necessary to remedy that by some legislative enactments, and the sooner such anomalies were got rid of the better. All simply permissive law was a mistake, no doubt about it. Another point to which he wished to

call attention was that the legislature was sometimes a little too impulsive. That was illustrated by what Mr. Michael had said about the prevention of smoke and the frequent occurrence of fogs—he thought Mr. Michael must have read the pamphlet about the “Doom of the Great City”—London destroyed by a fog. They had heard from Mr. Michael a great deal about the injury resulting from fog, but he thought with regard to the suppression of smoke, that some persons had been rather too impulsive, their action being apparently not entirely disinterested. He thought that the two Rivers Conservancy bills introduced this session were of the character he had mentioned—a little too impulsive. In the south-east of England they had had a succession of six wet years, and partly from that, but to a great extent from the water being drained too rapidly from the land, they had had such a succession of floods as was unprecedented at any rate in historic times. Two bills had been introduced into Parliament with a view to diminish the evils resulting from floods. So far as he had seen these bills they did not take into account the occurrence of droughts, but certain it was, that, sooner or later, there would be droughts as well as floods to contend with; droughts however were not in the public mind at present and consequently the two bills were strong measures taken to diminish the evils from floods. That he thought was a very lame way of dealing with the subject. He thought that it would have been better to have examined the water resources of the country before such strong measures were taken as the introduction of these Bills. It seemed to him something like taking a leap in the dark. He would touch upon only one other thing, the sewers. The present large size of sewers was no doubt rendered necessary in consequence of their having to carry off not only the rain water but the sub-soil water as well. That had a bad result in two ways: first, in making the sewage matter too poor to be profitably utilized; secondly, the sewers being so large, were more expensive to construct. The sewage was spoilt in two or three ways: first, by diluting it largely with much water that need not go through the sewers; secondly, this mode of diluting it involves cost in addition to that of the sewers—the cost of pumping power to lift it up to the level required for its discharge or treatment; besides that, there was exposed a large surface covered with very foul matter. Lastly, through the large size of the sewers, the sewage matter passed through so slowly that there was time for the deposit of the more solid matter, rendering the effluent sewage infinitely less valuable.

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THE discussion was resumed on Wednesday, the 9th of March, Dr. B. W. RICHARDSON, F.R.S., occupying the Chair.

Mr. J. F. BATEMAN, F.R.SS.L. & E., said it was apparent that Mr. Michael had given most elaborate consideration to the whole matter, and few would find themselves able to enter into the subject discussed, with the readiness and power displayed by Mr. Michael. For his own part, he acknowledged that he had been unable to give the time which would be necessary to discuss adequately the whole of the important questions dealt with in the paper. As to the first point proposed, the re-arrangement of districts, there would be great difficulties in the way of carrying out the suggestions of making the magistrates sanitary authorities. The magistrates in the various counties and divisions of counties were entrusted with great powers, and had great responsibilities, but these could not extend beyond the borders of those counties or divisions of counties. Hence, if it were proposed to make the magistrates the sanitary authority over a river, there would be a number of such authorities for every river; for the Thames, for instance, passes through several counties, and the sanitary powers of magistrates could only extend over such parts of the river as belonged to their counties. Then again, there were comparatively small river basins in which there were large and important townships, and large basins in which there were small and unimportant places. The River Irwell supplied an instance of the many important places which there might be in a comparatively small area, and this had been called the hardest worked stream in the world. It rose some thirty or forty miles from the tide-way, and in that narrow compass passed by many towns, draining hill and vale. The instance he could find of the other areas was the town of Greenock, on the Clyde, where there was the tide, and, to a town like this, as well as to Liverpool, the most convenient manner of dealing with the sewage would be to discharge it into the tide running past the town at the rate of many miles per hour. But with regard to the Irwell, there was continuous population throughout the whole of the narrow valley. There was no land upon which the sewage could be used, and therefore, other means would be necessary to deal with the sewage in some form other than by irrigation unless it was carried to a great distance, which was not possible there. And he should be sorry to say that sanitarians were yet agreed as to the best mode of applying sewage. Some said that the direct application of it to land was the best, while others held that it should be always dealt with by chemical precipitation. Some saying one thing and some another, but he held that in all cases it was necessary to consider the circumstances of each town, and also the peculiarities of the surrounding districts. In some cases he had no doubt that the application of the sewage to land, under favourable circumstances, might be the best; in other cases such application of sewage might be utterly out of the question, and some other means—precipitation, or by turning it directly into the river—might be the best. But in every case he thought that all the circumstances



ought to be taken into account which might affect the proper distribution of the sewage. Some persons thought the river basins might be arranged into districts. Well, he happened to live himself in what was called a river basin. He lived, too, below a town prohibited from draining its sewage into the river. This river passed through a most beautiful part of the country, and it was thought that it would be a pity that the beauty of that river country should be destroyed by the sewage of a town being drained into it. It was the duty of every riparian owner to keep the river as pure as possible, and it was also to the interest of the town through which it ran to keep it pure as a precaution against contagious diseases. There were other towns in the valley, and they could not irrigate the land without considerable expense in pumping the sewage on to suitable land. If the sewage was precipitated by a chemical process they might succeed, but, at any rate, there were various advocates for the various means suggested with respect to the best mode of disposing of the sewage. One thing he wished to impress upon them was that the question of making a profit out of the sewage ought not to be considered. Every town ought to provide for the health and well-being of its inhabitants, and, therefore, if it was necessary that the sewage should be disposed of, the best way that could be conceived should be adopted without reference to any commercial results: whether it paid or not, it was clearly the duty of that town to incur the outlay necessary. London ought to incur whatever expense was requisite in order to purify London. If the Thames, by discharging sewage at the places north and south where it was discharged, was injurious it was clearly the duty of the authorities of London to be at the expense of removing the nuisance which they themselves created, without reference to any commercial advantage and with the sole object of purifying the City of London; and so with every other town. The re-arrangement of districts would, indeed, be a very difficult task. He was in favour of some central authority which should be able to call upon a town to do its duty. And here, he said, he did not quite agree with those gentlemen who claimed to have a great deal of experience because they happened to be Vestrymen. All he could say was, that so far as London was concerned, the sooner vestries were knocked on the head the better. There should be one great central authority working for the benefit of the four millions of London and its suburbs. That would be better for the inhabitants than the present sub-division of the Metropolis into some 30 or 40 petty districts. The experience gained by sitting on such boards for a dozen years it would be better, as a rule, to forget entirely. He altogether objected to the remarks of one gentleman who had in the discussion spoken very disrespectfully of an engineer, alleging that he had admitted that certain advice given him was correct, but stating that there was a contract for £85,000, and that his commission on that was 5 per cent. Of course it was insinuated that the engineer went on with an undertaking which he knew to be defective because he should get 5 per cent. on a contract for £85,000. Now he (the speaker), on the part of civil engineers, denied that they were guided by such considerations, and urged that it was a sugges-

tion which never ought to have been made. The interest of their clients and their own reputation were too dear to civil engineers to induce them to be influenced by the 5 per cent. commission they received, and which 5 per cent. did not all go into their pockets, but was subject to large deductions for great expenses and trouble incurred. He concluded that engineers were not paid beyond what they were entitled to, having regard to their education and the special attention they gave to particular subjects, and he did not believe it was possible that any respectable engineer could have been guilty of recommending a scheme which he believed to be defective merely in order to put money into his pocket. Passing to the next question—the reconstitution of authorities,—he said he did not think there should be such a redistribution of authorities as would prevent a town or village—especially a large town—from carrying out what, under all the circumstances, might appear to be the best for its own purposes; but at the same time he thought there should be a general board which should undertake the supervision of all the country—of every river basin, and of every town, for the benefit of the whole community. To that extent he thought there might be a redistribution of authority. Local parishes or local towns should carry out the works necessary for their own amelioration or preservation under the guidance of some central body which, like a Board of Health, should exercise such a supervision over the whole administration of the country as would tend to the benefit of all. As to the extension of sanitary powers, it might be very desirable in many cases. A town might be so cramped that it could not drain itself properly because there might be somebody interposing a difficulty with regard to the sewage being discharged into the river. It might be necessary to irrigate the land or to precipitate the sewage by chemical means, and it might be that the town could not carry either of these plans out because there might be an impediment in the way. He thought there ought to be power to remove such impediments—in fact, that the good of all ought to be considered before the benefit of the private individual. Whatever might be necessary, to extend the authority of sanitary boards or towns should be secured, and in that way not only would the distribution of districts have to be very carefully considered (and he was not at all sure that the division into “river basins” would be the best mode of dividing districts), but they would have to be considered especially with reference to the extent of the “basin,” the size of the towns, and the importance or otherwise of the towns. There were many rivers like the Irwell, the Clyde, and the Thames, with a succession of towns upon them, and, therefore, not only the interest of the rural or urban population would have to be thought of, but those towns would also have to be considered in any decision as to what the district should be. As for the reconstitution of authority he did not know what he could say in regard to the question. There should, however, in his opinion, be such an extension of powers as would enable a population aggregated in hundreds or hundreds of thousands to carry out such sewage works

as might be needful for the purpose of completely disposing of the sewage of the town and destroying everything like bad drainage or damp sub-soil. There might be objections to a central authority, but, inasmuch as certain diseases and offensive animals had entirely disappeared from this country, or nearly so, we could very fairly test by the experience which the past exhibited what should be done in the future in putting an end to a great many nuisances which now existed, and which ought not to exist. And, although the operation of such a Board might interfere with the comfort of individuals, he did not think that the comfort of individuals should be allowed to interfere with the general health or the general welfare of the community at large. In conclusion, he thanked them for the patient hearing they had accorded him, and expressed the great pleasure he felt at being present.

Mr. CUNNINGHAM GLEN, Q.C., regretted that any observation of his should be construed as casting a reflection upon civil engineers generally, in the carrying out of sanitary works; at the same time he could but add that what he had said was perfectly true. That a sanitary engineer came to him and asked his opinion upon a scheme for carrying out some proposed sanitary works, and when he (Mr. Glen) pointed out that the scheme violated or disregarded some important sanitary principles, the engineer replied that he agreed with Mr. Glen, but the contract for the work was £85,000, and he was to have a commission of 5 per cent. upon it.

Dr. E. F. WILLOUGHBY said that he felt some diffidence in rising, since he had had no personal experience in any official capacity, of the working of the Sanitary Acts, though he had for years taken an active interest in all that concerned the public health. He should direct his remarks chiefly to the question of the constitution of the Sanitary Authorities, for he thought it premature to discuss the extension of sanitary powers until some definite conclusion had been arrived at as to the constitution of the authorities, by whom these powers were to be exercised. With regard, however, to the first question, the redistribution of sanitary areas, he would call attention to one point which had not been noticed. While fully realising the importance of having regard to the natural configuration of the country, and convinced that for purposes of drainage and of water supply, river basins would make the most convenient sanitary units, he must say that the absolute necessity for a close correspondence between the sanitary and registration districts for all statistical purposes was so obvious, that unless the latter could be revised, all other considerations must give way to this. Most of the inconveniences incident to a want of correspondence between the natural features and the conventional divisions of a country would be obviated by the establishment of County Boards, and the Boards of contiguous counties would find no difficulty in co-operating for the execution of drainage schemes, and the conservancy of rivers. But these Boards should be composed, not merely of gentlemen of high social position and of liberal views, in numbers



sufficient to overpower the obstructive and selfish element, but should contain a considerable proportion of gentlemen possessing special professional and scientific knowledge, as medical men known to take an interest in sanitation, and not holding poor-law appointments, engineers and architects of repute and independence who might advise, but should be disqualified from taking contracts within the jurisdiction of their own boards, and a sprinkling of gentlemen of any or of no profession, but possessing special knowledge, as geologists, meteorologists, or chemists. By their means many a costly blunder would be avoided, and in such a board, as we now contemplate, their opinions would be received with the respect due to them. Something of the kind already exists in Holland, where the medical and scientific element is largely represented in the superior boards. Recent legislation with regard to the appointments of Medical Officers of Health, and the relation in which those Officers stood to the local authorities had resulted in a mass of confusion and anomalies. In many districts, these duties were thrust upon parochial surgeons, without any regard to their special fitness for the work; and the remuneration was often of the most paltry character, in one case nothing was given, and in others, sums of £2, £5, £10, and £20 per annum. Of course these Officers were at the mercy of the Guardians, who were, too often, the very offenders. Not only were the Guardians jealous of any expenditure on matters of which they were profoundly ignorant, but they were too often actually the very offenders against whom proceedings ought to be taken. The position of a Medical Officer of a large combined county district seemed at first sight all that could be desired; he was a man of high scientific attainments, with an adequate salary, devoting his whole time to the duties of his office; and the Local Government Board, who paid half his salary, reserved to themselves the right of approving the terms and conditions of the appointment, so that he could not be dismissed without their approval. But this apparent security was quite delusive. These combinations may not have been made for terms exceeding five years, and as the combination of rural districts was voluntary, at the end of that time the districts might voluntarily dissociate themselves. The Local Government Board might know perfectly well that the constituent districts were withdrawing solely because the Officer had done his duty, in fact because he had, perhaps, carried out the injunctions of their own inspectors, yet they must acquiesce in his dismissal,—they could not compel continuous combination. They might protest, but it would be powerlessly, and they must afterwards approve of the acts of recalcitrant boards. Many gentlemen present knew that this had happened. The offence of the Medical Officer was that he called the attention of the Sanitary and Local Authorities to the abominable condition of certain villages which were annually decimated by diphtheria and typhoid fever, and though his reports were borne out fully by inspectors sent down from Whitehall, he was thrown upon the world, having previously relinquished a large and lucrative practice for his official duties. In another case, the Medical Officer committed the offence of calling the attention of one of the boards to the conduct of their own chairman



in turning his sewage into a river which ultimately supplied the London water companies, and his salary diminished by a hundred pounds. That a man who could not be supposed to have any interest at heart but the interest of his fellow-creatures should be thus at the mercy of the people who were the very offenders themselves, was scandalous and would not be tolerated for a single day in any other department. He did not mean to say that all guardians were selfish, any more than that all shipowners and mine-owners were, but they would realise the state of affairs if they could imagine an inspector of shipping, under Mr. Plimsoll's Act, holding office so long only as he could avoid giving offence to the owners of rotten hulks and coffin ships. Yet such was a simple statement of the position of the Local Officer of Health in England now. The whole sanitary administration required reconstituting. If not actually state servants they ought to be secured in their offices so long as they discharged their duties with discretion and efficiency. What was wanted was a compulsory and permanent combination of rural districts, a complete assimilation of the rural and urban regulations. In towns where it might not be difficult to give such a salary as would induce a man of high position to forego all other employment, he should give proof of special qualifications, and then be made independent of the favour or the fear of the Guardians. He would just say a few words on one other point,—the expediency of appointing a Minister of Health. This subject had been very fully discussed at the National Congress of Hygiene, held last year at Milan. An almost unanimous opinion was expressed against the appointment of a Minister who should change with every change of party; on the other hand, it had been generally agreed that there should be a Board of Health in each country—a precedent being found in the National Board of Washington—which should be composed partly of men representing Hygienic science, and partly of men of administrative capacity. Whether the Chairman should be a physician or a layman was not agreed, but preponderance of opinion was decidedly in favour of the former. This individual was to be in the position of, in England, a permanent Under-Secretary of State. One objection to a Minister who should change with his party would be, in this country, where barristers were considered the best Ministers of War, and stationers the best men to whom to entrust the management of the navy, that he would rarely have any special knowledge of his work. This Officer should be in direct communication with one member of the Cabinet. In this country we had the materials for this Board ready to hand in the Medical and Engineering Departments of the Local Government Board, the Registrar-General's Office, and the Factory and other inspectors of the Board of Trade, and he thought that, since medical men take so little part in politics, there would be no difficulty in finding a permanent President who would be acceptable to Sanatarians in general, and to any Minister who might be in power for the time being.

Mr. HENRY LAW, M.I.C.E., had not had the pleasure of being present at the last meeting, but had read with great care and satisfaction the paper which Mr. Michael had prepared, and the observations also which had been made by those who had taken part in the discussion on the last occasion. He saw, however, that Mr. Stephens had stated that the 15th and 21st clauses of the Public Health Act rendered it compulsory on Sanitary Authorities to take the whole of the roof water and the subsoil water. The fact was that these clauses did not place any obligation at all of this nature. The 15th clause simply said that the Local Authorities should make effectual drains, and the 21st set forth that every owner of property should have a right to his drains being connected with a sewer; but every Authority was at liberty to adopt either the separate or the combined system, and to dispose of the sewage as might seem necessary, according to the special circumstances of the district. There was nothing compulsory. It had been his intention to refer to the matter which Mr. Bateman had spoken upon, with respect to the engineer referred to by Mr. Glen, but as the circumstances had been touched on by another speaker, he would not do so. He trusted, however, that no person who allowed an expenditure of £85,000 upon what he knew would be an abortive scheme, because he could gain his per-centage, would be either a member of the Institution of Civil Engineers or of the Sanitary Institute of Great Britain. He did not think the other instance quoted by Mr. Glen, with regard to the Thames, had been more fortunate. It was not very long since two eminent Authorities had prepared a highly sensational report, which culminated in legal proceedings being taken by the Thames Conservators against the Metropolitan Board of Works, resulting in a wasteful expenditure to the public of about £20,000. The result of this case had been the unanimous decision of the umpire and two arbitrators that the Conservators were mistaken in supposing that the sewage discharged at Barking and Crossness caused any injury to the navigation. The chemical evidence had occupied more than half of the enquiry, and it had been shown that the Thames was to a certain extent polluted throughout its whole length, but the greatest amount of pollution was above Teddington Lock. He could say that he himself had been acquainted with the Thames for over 40 years, and that he had no hesitation in asserting that, both as regarded navigation and chemical pollution, it was in a better state now than it had ever been before. He quite admitted that the river was muddier, that it contained much more matter in suspension, but this arose from the improved drainage of the uplands, from the greater height attained by the tides, and from the extent to which steam navigation prevailed. Having made a very careful examination of the Thames during the past autumn, from Oxford downwards, he was able to state positively, that throughout almost the entire length, the banks were being rapidly washed away, and that it would be a very great improvement if something could be done to protect them. He did not bring this forward as a complaint against the Conservators; they did not possess the financial

means of accomplishing what was desirable. Mr. Glen had expressed an engineering opinion, but there was a very good old adage, that a cobbler should always stick to his last. They had been told by Mr. Glen that the large system of metropolitan drainage was a gigantic blunder. He did not think that Sir Joseph Bazalgette or the ratepayers would be very much concerned about the expression of that opinion. The re-arrangement of districts was a subject to which he had for a long time specially directed his attention. One or two of the speakers had said that in any re-arrangement the area should be made coterminous with the registration districts and with the counties. He thought, however, that Mr. Symons had really pointed to what should, as far as possible, be the leading principle in the arrangement of areas, viz., that they should be guided by the physical features of the country. Mr. Bateman, who knew what the difficulties would be in having any wholesale re-arrangements, recommended, as far as possible, that there should be a central controlling body, which would be of course required: then there must be bodies who would have control over the water-sheds, so that works for the improvement of the drainage of the water-sheds, and for the economical distribution of the waters, should be under one management; then those water-sheds should be broken up into manageable areas, which should be properly represented upon the larger boards, and in this way the works would only be carried out upon a combined and general scheme. Of course they could not draw any hard and fast line; there must be an elastic plan, because frequently there would be a large town situated, perhaps, partly in one water-shed and partly in another. No person who had had much experience of the working of the present Public Health Act could fail to see how many difficulties had been entailed by adopting the arbitrary areas of the Poor Law Act. The greatest confusion had resulted from this cause. As a general rule, a public road formed the boundary. The sewers usually followed the lines of the public roads, and, therefore, innumerable instances arose in which the houses on one side of a road were drained into the sewer, and those on the other were not drained into it at all. In other cases there would be some high lands intervening between two parts of the district without there being a possibility of *one* Sanitary Authority draining both portions of the area. Cases such as this would be met by enlarging the sphere of action, so as to get a greater number of the unions together; there would thus be fewer of these districts separated by intervening spurs. He would not detain them longer, there being so many gentlemen in the room more capable than he was of speaking on the legal points.

Mr. STEPHENS: With regard to what I said about the Public Health Act, I think, Mr. Chairman, that the gentleman who has just sat down will find, if he will refer again to the language of the 15th and 21st sections, that he will be under the necessity of agreeing with me, and not of differing from me.

Mr. LAW: I have them here; I will read them if you like.



The CHAIRMAN, however, called upon

Mr. ROGERS FIELD, B.A., who remarked that he felt bound to agree with Mr. Stephens rather than with Mr. Law. He was acquainted with the actual state of affairs from his own experience. A town had adopted the separate system of sewers to a large extent, and had got two sets of sewers, one for sewage and one for rainfall. He himself was consulting-engineer to the Local Board of Health, and had been asked to draw up certain bye-laws and regulations with reference to the drainage of the houses. It was wished by the Local Board that the houses should send their surface-water into the surface drains and their sewage into the sewage drains, but it was found that a regulation could not be made, requiring the separation of the two systems. He himself had gone to the Local Government Board, and had inquired about the matter, and he was referred to the Public Health Act, with the observation that the householders could not be compelled to separate their rainfall from their sewage. Certain conditions there were which could be enforced, but this was not a matter which the householders could be obliged to comply with.

A MEMBER : That is precisely what Mr. Law said : it was optional.

Mr. ROGERS FIELD replied that it was not optional as regards the Local Board. He had understood Mr. Stephens to say that the Board could not do as they wished, and such was the case.

The CHAIRMAN : I will give Mr. Stephens the opportunity in a moment of making any further explanation.

Mr. ROGERS FIELD proceeded : on the last occasion a good deal had been said about the interference of the Local Government Board, and the great mischief they did. So far as his own experience went he must say he was rather inclined to complain the other way. The inspectors, he believed, hardly ever interfered in any local scheme, unless it was very bad indeed. Their tendency, he considered, was to pass any scheme brought forward by the Sanitary Authority, if there was anything in the world to be said in favour of it ; and he had certainly not seen any instance in which schemes had been forced upon the Authorities by the Local Government Board. House drainage was a most important point, and he thought the Local Government Board had done a great deal of good in that direction. It was very little use having a good system of sewers, if they did not have also a good system of house drainage. The Model Bye-laws which had been drawn up by the Local Government Board, and which could now be adopted by Sanitary Authorities, were doing a vast deal of good. They embodied the most modern improvements in drainage, indeed all those matters which were now generally admitted to be right. Here, therefore, was a code of Bye-laws, laying down the proper way of carrying out house drainage ; of course the Bye-laws were not always adopted, but the very first step in the direction of seeing them



adopted was to have such a code. Unfortunately the Metropolis was not under the Public Health Act; the Vestries had no Bye-laws,—at least, very inefficient ones. The kind of thing constantly occurring was this: one pointed out certain defects in the drainage of a house which any man who knew anything about the subject would agree with, and then, although the householder or the builder might be shown that the condition of things was grossly wrong, one was met with the remark, “Oh, there is a difference of opinion about that.” But certain matters existed, about which there could be no possible difference of opinion, and in their case one ought to be able to appeal to some regulations of acknowledged authority. At present one could say nothing except what he himself had not long ago said to a builder, who was also a member of a vestry in London: “There is no difference of opinion amongst people who know anything about it,” and he hoped, before many years were over, to find that the Bye-laws of the vestry itself would oblige the observance of the precaution which it was endeavoured to avoid by alleging “difference of opinion.” The precaution in question was the “disconnection” of an over-flow pipe from the drain, or something of that sort. He contended that merely by framing these Model Bye-laws the Local Government Board had done good service to the cause of sanitary progress.

Mr. W. C. Fooks, Jun.: Speaking as one of the legal profession, said that while it was evident that a great interest in this subject was felt by the medical profession, the body to which he belonged also claimed an interest in the matter. It seemed to him that after all they had heard upon it they must confess that our sanitary administration, as at present carried out, had altogether broken down, so far as complete efficiency was concerned. In answer to those who differed from him in this opinion, he would call in evidence the speeches which had been delivered on the paper. He should also start with the proposition that the principles of sanitation, as applied to social life, must necessarily be a progressive science, and that consequently it was impossible to frame, once and for all time, a precise and definite code of laws, but what was required was an elastic or progressive system to be of any use. He proposed to take as his text the following words used by Mr. Michael, on page 12 of his paper:—“The importance of the conservation of the public health should have greater recognition in the machinery of the state, and its proper estimation should be enforced by the creation of a Ministry of Health, charged with the supervision of all Sanitary Authorities, not merely as a controlling body to regulate expenditure.” He cordially agreed with the conclusion to which the learned writer had come; that what was required was the reconstitution of authorities, so that the powers already granted might be better used for the good of the public rather than that the powers themselves should be increased. In illustration of his remarks, he might remind those present that the laws relating to sanitation were scattered over a variety of statutes numbering upwards of five-and-twenty, and ranging from the time of Henry the Eighth to the present. Some of these were devoted entirely to sani-

tary legislation, and some dealt of divers other subjects, and not only had this very confusing, and sometimes conflicting, mass of authorities to be consulted, but the power to carry the laws into effect ranged from the policeman to the Privy Council—the Alpha and Omega, it might be said, of official administration. Such a state of things as this ought not to be allowed to continue in the nineteenth century. The first essential towards amelioration would be to constitute a Ministry of Health, with directory and compulsory powers under a permanent president. Next it was desirable that a permanent commission should be constituted for the purpose of regulating and settling from time to time the basis on which the Ministry of Health should carry its powers into effect. He was not an advocate for county boards, and would like to see abolished all intermediary powers, so that the Ministry of Health might be brought into direct contact with the authorities charged to carry its resolutions into effect. He could quite conceive the passing of an Act of Parliament establishing such a Ministry, and that Ministry and the permanent committee associated with it, promulgating from time to time, after due notice, the regulations which ought to be observed in reference to the application of sanitary principles to social life. Of course they could not be blind to the difficulties besetting this subject. Not only the different municipal and other bodies had to be consulted, but even individuals would need to be considered and conciliated. The office of such a Ministerial Department would be to settle and apply the laws under which habitations should be erected; and the more difficult question, what should be the extent of interference with the personal rights of individuals in the administration of their own homes? He could not help feeling some diffidence after what had been said about vestries, but he would venture to give his own experience as a Vestryman on the ground that an ounce of experience was said to be worth more than a pound of theory. And his experience was that in the proper and efficient administration of the Sanitary Laws there is at present a failure. As an instance of sanitary breakdown he referred to the recent case of “*Hill v. the Metropolitan Asylums Board*.” It ought to have been known beforehand whether or not it was desirable that such a building as the one in the case in question ought to have been erected at such a place, and for such a purpose. No proper previous inquiry seemed however to have been made, and the result was a practical breakdown in the administration of the law with reference to a contagious disease like small-pox. As a Vestryman of the parish of Hampstead, he could assure the meeting that the case he had just referred to had given his board no little trouble. The statutory powers enabling metropolitan asylums to be established, seemed divided between the Boards of Guardians and the Metropolitan Asylums Board; and what with recommendations sent for their guidance by the Local Government Board, correspondence with the Asylums Board, and intercommunication between his board and the Guardians, the Vestry really did not know what they ought to do; the Guardians, he was told, did not know what they themselves ought to do; and the Local Govern-

ment Board said that all they had to do was to give advice. The whole thing thus resulted in a *fiasco*. There was one other matter that he would like to refer to, which, although it might be deemed by some a very small matter, was really very important, and in which there had been, in his view, a breakdown, viz., the removal of dust; and after remarking that it was admitted that the non-removal of dust was likely to prove a nuisance, and extremely dangerous to health, Mr. Fooks urged that, in order to effectually remove any difficulty on that score, there should be a remedy capable of easy enforcement, placed in the hands of the householder, against the person directly charged with the duty of removing dust, which, under the system at present obtaining in his parish, at all events, was not the case, owing to divided authority and responsibility. He thanked the President for allowing him, by calling upon him, the opportunity of saying a few words, and the meeting for the patience with which they had heard him.

Mr. HENRY C. BURDETT, F.S.S., very much regretted that he had been unable to attend at the reading of the paper. As a member of the Council, he desired to have shown by his presence how much he appreciated the care and time Mr. Michael had evidently devoted to it. The paper would worthily inaugurate a course of meetings which he hoped would prove of benefit to a large number of people, and which would at any rate be valued by that portion of the public which took an immediate interest in sanitary subjects. In the remarks he was about to make he would try to confine himself entirely to the practical aspects of the question, as they had presented themselves to him, in his own actual experience. One re-arrangement sadly needed was that throughout the country, with the exception of boroughs and large towns, there should be a combination of the small districts, and it should be made compulsory upon a certain number of authorities within a given area to combine for the purposes of health legislation. It could not be expected that a Medical Officer would give up his whole time, or even a great part of it, to the duties of such an office in a small district, where the remuneration was so small as to be scarcely a consideration to him. In one case, in a small town in Essex, the gentleman who was appointed Medical Officer of Health received £40 a year for his services. This was rather a large sum compared with the scale which usually regulated these payments. What happened? One day, when he had been appointed about a month, he was called to the market-place, and there he found a lot of stinking fish. He condemned the fish, as he was bound to do: he was new to his work. In the evening he was visited by several of the principal tradesmen of the town and his private patients, who told him that Jones—he would say—the fishmonger, was a very great friend of theirs, and that if he (the Medical Officer) meant to interfere with trade in that way they would be under the necessity of finding another private medical attendant for themselves and their families. His response was that in these circumstances he had three courses open to him. He could take his salary as Medical Officer of



Heath, and neglect his duty ; he could resign the appointment ; or he could hold on to the appointment, do his duty, and lose his private practice. Being a family man, and, he hoped, an honest one, he resigned his appointment, and decided to devote himself to the duties of an ordinary medical practitioner. If they were all to talk for an hour they would scarcely get anything more forcibly showing the reason of the failure of the present system to secure adequate sanitary arrangements in the smaller districts.

In combined districts what was the state of the case ? The combination being entirely voluntary, it lasted just so long as the Medical Officer of Health, whoever he might be for the time being, did not tread upon the toes of some of the minor Local Authorities. Directly he did so, directly he condemned the health arrangements of Little Bumbledom, he was liable to an immediate curtailment of of his income, because one by one the districts rejected health supervision, and the income became so small that the Medical Officer was compelled to commit the happy dispatch, as Dr. Fox had done. Dr. Fox said, "This district is in a very bad state, and requires a great amount of work to be done. If you decline to do that work, and withdraw from the combination, as I must have an income to live upon, I must retire, and resign my appointment." Now, did Parliament mean that health legislation should be a practical fact, or did it not ? If it did mean it to be a practical fact, then it was no use having an Act of Parliament without powers to enforce its provisions where necessary. If we are to have adequate measures for the prevention of, and protection against, disease in England, there must be combined districts, and there must be sufficient power vested in the central Authorities to protect the Medical Officer, when the latter is earnest and hard-working enough to do his duty conscientiously. For his own part, he would like to see all small districts disappear ; he would like to see, as far as possible, districts made so large that every Medical Officer of Health must necessarily devote his whole time to the duties of his office. If this was once accomplished, he believed they would realise in a small time an amount of progress which would convince the people generally how much sound sense there had been in the contentions of those who had stood in the forefront of sanitary agitation for years past. As to reconstitution of authorities, he himself had lived in one district of the Metropolis for the last six years, and had taken an active interest in all health matters there. As a matter of fact, there was no efficient health jurisdiction at all at Greenwich. The streets were, many of them, in a condition which made it extremely disagreeable for ladies to walk in at all. Outbreaks of small-pox and infectious diseases were not nearly so carefully looked after as they ought to be ; and when, a few years ago, the health authorities were warned that if they did not take adequate steps to prevent the evils which threatened, a high death-rate would ensue ; the only steps taken were to send inspectors round to disinfect dwellings *after* the outbreak of fever had occurred. One of these men had been followed in order to see what he really did, and it was found that the inspector, instead



of entering any of the houses, merely knocked at each door and said, "You have some cases of scarlet fever here?" and then, the reply being "Yes," would add, "Here is a box of disinfecting powder—use it *freely*." This was not in Ireland, nor in a remote country district, but at Greenwich, within a few miles of the Metropolis. Such a state of affairs, he thought, demanded amelioration—and very speedy amelioration. At the present time the health authorities were not very much controlled by the ratepayers. The election of these bodies was made by the Vestries, and the ratepayers did not understand how the thing was managed. There ought to be a separate election of all health authorities.

The extension of sanitary powers was certainly needed for isolating infectious diseases. In all centres of population there ought to be a hospital to which all cases of infectious disease could be sent. In that way they would do something towards making mothers understand that it was by no means necessary that children should have the measles, whooping-cough, scarlet fever, and other things they now looked upon as a matter of course. The powers to prevent over-crowding ought certainly to be increased. He had found it very difficult, indeed, to get the Authorities anywhere to come down with sufficient force and speed on the owners of property where over-crowding existed. It was the sub-letting of tenement-houses which was the prime cause of over-crowding. Tenement-houses were sub-let to a class of men known as "deputies." The deputy endeavoured to get as much money as he could, and, accordingly, crowded every room in the house. Dangers were thus created which could easily be avoided if the clauses were clearer, and the penalties greater and more easily enforced. In conclusion, he did hope, in spite of the control which the Local Government Board now nominally exercised, that there was a determination in the country to have a proper, that is to say, a distinct Department of Public Health. There was no doubt at all that unless there was such a department, with adequate power to support and enforce its authority, the country would always be in the same slipshod condition in reference to health matters. Local Government Board Inspectors at present went down to a place and made long reports to the effect that it was in as bad a state as it could possibly be. Yet amelioration was seldom effected. In one case, at Northampton, the condition was worse now than it had been ten years ago, when the Local Government Inspector reported that it was almost intolerable. He should welcome any measure which gave an extension of sanitary powers with adequate provisions for their enforcement. He did not wish to be misunderstood. By all means let them be practical reformers, as those who strove to enforce the truths of preventive medicine ought to be. What was necessary was the creation of powers, and not necessarily the enforcement, and certainly not the two frequent or hasty enforcement, of these powers. At present a Local Authority could, and often did, snap its fingers at the Local Government Board with impunity, and thus prevent the sanitary improvement of all places within its jurisdiction. These extreme cases ought to be promptly

met by the law asserting its authority and forbidding the needless, and perhaps culpable sacrifice of life, by a small body composed mainly, if not wholly, of interested persons. It was no good legislating in advance of the education of a people; but the legislation he asked for would be popular and efficient, because it would protect the weak against the strong—because it would prevent the abuse of the law by Local Authorities, which at present too often did much to destroy the health and to ruin the morals of the people.

Dr. C. E. SAUNDERS could not help thinking that a highly pessimist view had been taken of sanitary legislation and administration in this country. He did not think it should be admitted that the sanitary administration had entirely broken down—at all events, from his own point of view as medical officer to one of the largest combined districts in the kingdom, he claimed that that was not the case. He admitted that greater powers were wanted, and that there ought to be greater attention paid to the reports of medical officers; but a very important work was being done in the country by medical officers of health. The subject of re-arrangement of districts must be approached from two points of view. From the engineer's point of view no doubt it was very desirable that there should be a re-arrangement on the basis of a drainage area, but for the purposes of the Medical Officer of Health's supervision and statistical work, the Poor-Law Union and registration districts were found sufficiently convenient. The combination of sanitary authorities in the appointment of a Medical Officer of Health was the most important element for efficient work. He entirely agreed in all that had been said as to the injustice that had been shown to medical officers of health, and it was quite time that their tenure of office was better secured. The re-constitution of the authorities was a question which he thought would not be very well dealt with by the constitution of county boards. After all, they had to consider the individuals who would form a county board. He apprehended that the people who now were the Guardians and Members of Urban Sanitary Authorities, and Magistrates, would necessarily compose a portion of such a board; and he could only say that the Justices at Quarter Sessions had not shown themselves at all better fitted to administer sanitary affairs than the Guardians or other Local Sanitary Authorities. In the Contagious Diseases (Animals) Act, the Privy Council were empowered to make bye-laws requiring that milk shops should be registered for inspection. This duty was entrusted to the Justices at Quarter Sessions, but although it was a most important provision, it has become almost a dead letter, for only in one or two counties had any action been taken. He thought the re-constitution of sanitary authorities and the extension of sanitary powers might be accomplished in a less sweeping way than that which had been contemplated by the learned author of the paper. He could not help thinking that many of the objections would be overcome by removing the anomalous distinction between urban and rural powers. He would not detain the meeting any longer, seeing the lateness of the hour.

Dr. H. C. BARTLETT remarked that the re-arrangement of districts had been dealt with from various standpoints during the discussion, but that not much could be added to what had been stated previously. Many of those present would probably remember how thoroughly the subject had been discussed at the Society of Arts, which discussion had brought out nearly all the suggestions now made. He was very glad to hear that Mr. Michael thought compulsory legislation necessary, for unless compulsory, legislation in sanitary matters was almost useless. He went on to say that many Medical Officers of Health and Inspectors of Nuisances were incompetent to perform their work. He referred to the benefit arising from the Examinations of the Sanitary Institute for Local Surveyors and Inspectors of Nuisances, and the Certificates granted to successful Candidates, and he thought that all Local Authorities should require Inspectors to produce a recognised certificate of this kind as to their competence to discharge their duties.

Mr. H. A. RIGG had gone there that evening for the purpose of learning something, and not with any intention of making a speech. What, however, had struck him, as an outsider—and it might perhaps be a useful suggestion to those who were learned on the subject—was that they did not appear to be sufficiently considering that very important factor, the British public. The British public had a great horror of any further step in the matter of sanitary legislation. He, himself, lived in a country place, about twenty miles from London, and they certainly did possess a plethora of authorities. If he wanted to have anything done to the road, he had to go six miles in one direction; if he wanted to go to the sanitary authorities, he had to travel six miles in the other direction. He was in one poor-law union, in another highway union, and there was a very good chance of his being soon in a local board district. The British public had been treated to so many authorities that they dreaded any fresh ones, and unless they set themselves to the task of consolidating, if possible, the authorities which existed now, they would not get the public on their side. His village was very badly drained; it was in a part of the Thames Valley where there was a flow of sub-soil water in a particular direction, and if they got their wells on the wrong side of the cesspool they were all wrong. With regard to their sewage, some of them had cesspools, some belonged to a special drainage district, some drained into the ditches: consequently, there was rather a mess. Some of them proposed that they should have a local board, but whether it was the medical officer, or the guardians of the poor, or whoever it might be, the ordinary country public had a great horror of local boards. Travelling the other night with a man who had the reputation of being a man of common sense in his district, he had found his idea of a local board, expressed in the words: "Oh, if you get a local board, you cannot put up a pigsty without asking their consent." The present idea was to have the Guardians over a local sanitary authority. They all knew what the Guardians were: they were properly described as very respectable men, and they could not be got



to do a thing they thought they ought not to do. He did not agree that the Court of Quarter Sessions was a bad court. The Chairman of Quarter Sessions in one district, which he knew, was Lord Derby, and in that case the tribunal was a very efficient one. He thought, however, it would be a mistake to get as an authority the local board or any body consisting purely of elected members, because the better class of people who lived in the country could not be got, except with very great difficulty, to serve, and they thus got an inferior set of men, who perpetrated jobs. First of all, it would be necessary to go in for a sort of crusade; they must wake the public up to the necessity of taking care of themselves, and he thought good would be done if such a society as their own were to emulate, say, the School of Cookery at South Kensington, and to send people round to show that a woman with typhus fever ought not to be put into the same room with her children. By simply directing the attention of the Legislature to the subject he did not think much would be gained.

The CHAIRMAN (Dr. Richardson, F.R.S.): I have thought, as I have listened to the discussion on Mr. Michael's excellent paper, that what may be called the flesh and blood argument has not altogether been considered or duly borne in mind. I shall perhaps be pardoned if I say that the various speakers seem to have forgotten largely that the basis of all human action lies, not in reasoning and knowledge, but in sentiment or emotion, and until you have overcome this, until you have won sentiment and tendency of feeling towards what you know and feel to be right, you will have no case at all to present to the people which will be of any kind of efficacy. Knowledge wins, I think, only when it conquers sentiment. How do we stand in respect to this matter? Out of the 25,000,000 of people, are there 25,000 who understands these questions at all? I should doubt it. The small bodies who stand forward as we do to devote ourselves to such questions, hardly make our voices heard amongst the great community; and, therefore, to go before the public offering ourselves as exponents of compulsion in any extreme form is entirely to defeat the object we have in view. We have had the case of vaccination exemplified, and the author of the paper is very strong on this point. He has taken it as a typical case, and he says that vaccination is such a necessity, that in respect to it compulsion should begin in the sternest possible manner. I would not be second to him in declaring the value of vaccination; I have always declared and felt the value of it, and I have ventured to differ with many of my medical brethren on the matter; for I believe that certain sources of evil which they have traced to vaccination do not spring from that at all, but from another cause which might be named, and which is not vaccination. But I entirely differ from Mr. Michael when he speaks of that compulsory vaccination, which would take the child out of the arms of its mother and put it into the hands of a policeman, for that would be to make the law an instrument to outrage all sentiment and everything humane. If ever that kind of experiment



were tried in England, vaccination would be doomed from that day for a very long time. Well, then we come to the local matters—redistribution of districts. Again we feel the same difficulty. There shall be a country place surrounded by old historical associations; the people have been long familiar with it, they like the place and everything connected with it. Do you think the natives of particular spots, the persons resident in places which are beloved by them, would allow a sanitary authority to come down to them and outrage all that they have become attached to? You would have just the same disturbance there as in the house in which a child was being taken from its mother to be put into the hands of a policeman. You cannot change a country in this rapid way,—you cannot change home life like this. Then, again, a central authority has not really the local knowledge necessary for carrying out such duties. Suppose I myself go down to a place of which I have no knowledge, though I may possess some knowledge of sanitary science, what do I do when I get there? Do I go through the district to see what is in progress, and ask no questions? Not at all. I go to the old inhabitants and to the most sensible persons there, and I ask them questions, and I get what information they themselves have; and every man who sets about work in this way comes back with a good report in his note book, a report which is not his own, but gleaned from the inhabitants themselves. Local knowledge must be applied in dealing with questions of this sort. We may know nothing of the local necessities of a place; nothing of the power of the people to pay for the changes which have to be made, and there are endless details of this nature. Therefore I should say that the re-arrangement would be the best which would more determinately localise, in any particular spot, an authority which would recognise the importance of promoting the public health. If you could get towns and villages to work with you in the same spirit, if you could get the proper sentiment at work, you would get each of those spots transformed into a place which would become healthy for and from the work of the inhabitants there. In no other way can I see that true reforms would be effectually carried out. As much can be done in a little place by those who have a good knowledge of it, as any woman of common sense can do to make her house perfectly healthy if she likes to exercise her skill. I would say, therefore, with regard to a central authority, and a distribution and re-arrangement of districts, that the better plan would be to make all the local parts perfect in themselves, and not to try to bring them together, and so produce clash and confusion. A re-distribution of authorities would simply lead to differences of opinion, and there would be no chance of unanimity being arrived at on the basis of divisions into districts of different character. As to the extension of sanitary powers, a central authority in London would, I believe, be of the greatest possible use, but it should, I think, be a directing not a compulsory authority. I believe that if we could aim towards the great end of raising sanitary science, as a science, to its highest pitch, and showing to the people its importance, its intention, its object, its perfect influence for the

good of the whole community ; if we could induce our Government to make a sanitary authority not feared but respected ; if we could get a Minister of Health who should not be in the cabinet nor change with changes of Government, nor have any veto on any subject, but be a directing authority,—a life peer if you like, that he might have a good position in society,—and if he had associated with him a good chemist a good meteorologist, a good registrar, a good veterinarian, a good agriculturist, if you could get such a directing body as that in London, which everybody would look up to with respect, and I had almost said with affection, then you would get such an influence in this country as would tell in every direction. There might be one other addition which I think Mr. Michael would say would not be difficult: there might be formed in connection with the Houses of Parliament a permanent committee, of those houses which might hear both sides of all disputed points, and suggest, or even order, what should be done in emergencies or in cases of extreme difficulty. One point in Mr. Michael's paper is the best of all ; it is that where he says that every man should be a law unto himself. I agree with him there entirely, and I would that this principle should extend from every man to every village, to every town, from the unit to the whole, to the country altogether.

Mr. MICHAEL replied : In commencing my reply to the discussion which has taken place, I would say what an eloquent commentary on the Local Government Board has been afforded by the speech of Mr. Glen, who was one of its legal advisers for a great number of years, when he assured us that the rivers of this country were its proper sewers, and ought to be utilised for that purpose. I am bound to say that I think he was a little inconsistent in what he goes on to say ; and it becomes of even greater importance in telling you, sir, what should be your duty in order to disseminate information, when the writer of the most "used" book on sanitary law—I may call it the standard authority—comes to a meeting and makes a speech so startling as the one he delivered. I should have thought that such a speech could only have been properly delivered in some of the swamps of the Indian Ocean. And when Mr. Glen says, further, that £20,000,000 or £30,000,000 have been sunk in sanitary measures in this country, as if that were a reproach, it is another of the most startling observations that I have ever heard at a public meeting. It is a statement which totally ignores the fact that a very large amount of money has been expended in buying up and constructing works of the utmost value, not only in the assistance they afford to the public, but as furnishing in times to come a source of great revenue. A large amount of money has been expended in the purchase or construction, or both, of gas and water-works, and by that very money so expended the time is coming, at no very distant period, when persons will have an opportunity of having gas and water entirely free of charge. So much for that sinking of the public money in sanitary measures ; and I cannot pass over without a protest the case of the Engineer which we were told of. What it amounts to is, that he proposed a plan of

drainage to cost £85,000, solely for the purpose of getting between £4,000 and 5,000 into his own pocket as commission, and, as a consequence, to carry out a scheme which would be of no advantage whatever. I must say that such conduct is totally inconsistent with the high character, which, in my opinion, Engineers in this country have always deserved and maintained. I will not say that Dr. Saunders does not understand the Public Health Act, 1875, there are a great number of persons who have fallen into exactly the same difficulty; and when we remember that upon this very subject of sewage and sewerage works, it expressly enacts that no works for an out-fall or the distribution of sewage shall be taken to be made until the sewage transmitted through them has been purified—it is in the very section he quotes to us—we cannot wonder that he has fallen into the error. Still, if he will allow me, as a person who has to study this subject, to give him any information, I may tell him that there is not a single word in the Public Health Act which casts any duty upon a local authority, binding them to one, two, three, four, five, or six systems of sewerage, if necessary for the purposes of disposal. But in several cases I know there are even so many as five distinct systems of sewerage carried out in one district. It becomes, indeed, almost inevitable when large districts are divided into sub-districts, where “hogs-backs” running through them, renders such division necessary. I may tell him also that there is not a single word which prevents the local authority from separating, as far as they possibly can, the road water, and storm water, from the ordinary sewage, in providing means for their disposal. Although it may be that there is no power in the Public Health Act to enforce bye-laws, and the Sanitary Authority has no power to say to an inhabitant, “You shall put your sewage matter into one sewer, and your rain and waste-water into another,” that is proceeding on an entirely different matter, which has nothing whatever to do with the primary question as to the construction of two systems of sewage, or a system of storm overflows. I was sorry to hear from you, sir (addressing Chairman), some of the observations you have made, because you have shown by your remarks that you are not practically acquainted with the carrying out, and the action, of works of sanitary authorities all through this country. It is very delightful to listen to you; you are always charming and always poetical, but charm and matters of poetry will not do in the ordinary business of every-day life, and what you have said in those remarks of yours, shows me that you are not conversant with what is done every day in every district throughout this country. Neither do you appear at all conversant with the plan which I have ventured, after an experience of twenty-five or thirty years, to put forward as the only one which may be said to solve the difficulties of this question. You speak of the 25,000,000 who are going to rise up in insurrection; there are no 25,000,000 possible; it is 25,000 who give us the trouble. The whole remainder of the population of England are as much convinced as you yourself are of the value of vaccination—(“No, no”)—the gentlemen who say “No, no” can know nothing, can have seen nothing of the wholesale adherence—



except in the case of those few obstinate persons who create a great deal of noise throughout the country—of the avidity with which women seize the opportunity of having their children vaccinated.

A MEMBER: I beg to state that I have the Registrar-General's reports, which I can quote from.

Mr. MICHAEL: You are quite at liberty to have your opinion. There must be a good deal of difference of opinion. Now let me give you a sketch of what I propose. The first needful principle is to encourage by every possible means local self-government; and nothing will be done, and nothing ought to be done, and most disastrous would it be if anything could be done in this country to diminish the importance of local self-government. It is the bounden duty of every Englishman to encourage by every means in his power the extension of local government, and to place it on a basis from which it can act for the benefit of the community, and you will find in my paper—it is necessarily so condensed as to make it, I know, rather obscure: I felt the difficulty, but I felt constrained to only trouble you for half-an-hour on a subject which might have occupied six hours—you will find that I say the failure of antecedent attempts has been the endeavour to impose what may be called a paternal legislation upon the country, and to attempt to carry it out from a central institution in London, and so to rule the remote parts of this great empire. In reality, the very basis of this question, as of so many others, is the matter of money. You should have in one authority an investiture of the rating power with all the other functions incident to sanitary and municipal government. Then you ought to have an intermediate authority of a very high character, acting locally, not in London, where it must fail, but in the district to be legislated upon, knowing all the local peculiarities, and able to see whether the means which are striven to be carried out should or should not be carried out, and to help in the consideration of those matters which are known to every one who is conversant with this subject as essentially local, and only to be decided by local considerations. That is my scheme; not a county authority to rule in the first instance, but as a buffer to intervene between the local authorities and central authority in London, the latter being a board which should assist with advice, and help in those difficult emergencies which have intervened, and inevitably must in the future as in the past intervene, to prevent the proper carrying out of sanitary precautions among the people. Excuse these few words, but it would take far too great an expenditure of my time and of your patience if I were to enter into all the matters which have been dealt with.

A cordial vote of thanks was passed to Mr. Michael for his valuable paper. The proceedings then terminated.



SUGGESTIONS FOR THE  
MANAGEMENT OF CASES OF SMALL-POX  
AND OTHER INFECTIOUS DISEASES

IN THE METROPOLIS AND LARGE TOWNS.

BY BENJAMIN WARD RICHARDSON, M.D., LL.D., F.R.S.,  
CHAIRMAN OF THE COUNCIL.

*Read Wednesday, April 13th, 1881.\**

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ABSTRACT.

I.—The author deals, in the first instance, with the present position of the subject, and explains some of the difficulties that lie in the way of the practical management of persons suffering from infectious diseases in large cities and towns.

II.—He next treats on the question of registration of such diseases, gives some details of the early attempts at such registration, and explains what, in his opinion, should be included in the registration, and by whom it should be certified to the local authority.

III.—He maintains the thesis that there should be no aggregation of infectious cases in large central institutions, and describes the objections to such aggregation.

IV.—He suggests that every parish should bear its own burthens and accept its own responsibilities for the retention and management of the infectious cases occurring within its own boundaries.

V.—He suggests, further, that the sanitary committee or authority in every parish should have all the special centres of infection in each of its districts thoroughly mapped out, and that it should know, on a calculation of cases occurring in quinquennial periods, what is the permanent accommodation required for its infectious sick.

VI.—He urges that the required accommodation being known the local authorities should keep ready, at all times, within the

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\* The discussion occupied part of the evening of April 13th, and the whole of the evenings of April 27th and May 18th.

parish, such necessary accommodation, in small hospitals situated in different parts of the parish or locality.

VII.—He describes the size, mode of construction, and position of such hospitals :—

- (a) That each hospital should not be larger than is sufficient to receive twenty-four persons at one time.
- (b) That each should be constructed on the separate system for the patients.
- (c) That each should be constructed of iron, so that it may at any time be absolutely purified by fire throughout all its structure.
- (d) That each should be placed on the upper storey of a building, forming, in fact, the top storey of one or more houses, so that it may be lighted and ventilated directly from its roof.
- (e) That all the air that passes out of the hospital when it is occupied by infectious persons, should pass through fire.
- (f) That each patient should be carried into the hospital by a valved lift, which lift should pass through a shaft, so as to draw up air during its ascent, and which should, when required, be effective for flushing the hospital with air.

VIII.—He enters into the subject of the organisation of these hospitals in respect to general supervision and nursing. Under this head he recommends

- (a) That the general supervision should be in the hands of the Medical Officer of Health.
- (b) That the nursing, also under the supervision of the Medical Officer of Health, should be carried out by trained nurses, who might be educated to their work in the Union Infirmaries.

IX.—Lastly, the author suggests that the medical attendance should be conducted by a special staff of duly qualified medical men, acting under the Medical Officer of Health, and responsible to the local authority, by whom they should be approved and remunerated.

After the reading of the Paper, the following discussion ensued :—

Dr. B. W. RICHARDSON, occupying the Chair.

Mr. T. WALLER thought that the isolation of cases of infectious diseases in the elaborate way proposed in Dr. Richardson's address was not at all necessary, except when cases occurred in small houses or tenements where a room could not be set apart, and that they

might be quite safely treated in a private house, if ordinary care were used, and the room thoroughly ventilated; he had treated cases of small-pox and scarlet fever in his own house, while the room next to the patient and other rooms in the house were used by the family, without any spread of the disease. He thought that it was the duty of everyone to see that they had a well-ventilated room on the top story of their own house suitable for the reception of a case of infectious disease, before they set to tell others what they should do; the public would have greater confidence in their recommendations if they themselves practised what they recommended.

Dr. HAUGHTON considered that the distance which patients often had to be brought to the large hospitals was a great objection, because the sufferers occasionally died on the way; and were even a means of spreading infection, as they were conveyed along the streets. He said that people die in a much larger proportion in the hospitals than in their own homes; and that we have no right to compel them to go to the hospitals when this is the case.

He thought Dr. Richardson's suggestion of placing the hospitals over a row of terrace houses a good one in theory, but that popular feeling would be very strong against using the houses under the hospital. He did not quite agree with the proposal to use iron for the external walls; for, although it might do very well for portable or temporary structures, it was, he thought, not suitable for a permanent hospital, nor adapted for all seasons of the year. As an instance of the bad effect of aggregating cases of infectious diseases in large hospitals, he mentioned the case of a ward in the Royal Free Hospital, which, after several years, got so saturated with morbid germs that surgical operations could not be performed in it without bad results, which results immediately ceased after the replastering of the walls one inch deep. The proper registration of infectious diseases was no doubt very desirable; but there were many reasons why a medical practitioner did not like to give notice of diseases, and it would be hard to compel him to do so in all cases.

Dr. COLLIE remarked that with reference to the case mentioned by Dr. Haughton, it was quite true that if you did not properly cleanse and ventilate a hospital the wards would get foul, but that it was quite possible, with proper attention to these precautions, to keep them pure, and that such a case as that of the Royal Free Hospital ought never to occur. He considered that the word over-crowding was misapplied to large hospitals, as it did not, he thought, matter how many patients were put in one hospital or one ward, as long as a sufficient cubic space was allowed to each. He dissented from the statement of Dr. Richardson that the efficient supervision of large hospitals was impossible, and said that he had found no difficulty during his experience in the management of a hospital with 300 beds for infectious diseases, in seeing that the rules with reference to nurses, and the admission of visitors to patients were strictly observed, and he did not see that it would be easier to prevent the ad-

mission of visitors to small hospitals than to large ones ; then, on the other hand, it would be easier to get a good matron and good medical officers, and thereby necessarily better supervision for a large hospital, as a higher remuneration could be offered ; and the medical officers in the large hospitals would get a much larger experience of the disease, which would be a benefit to the sick. He contended that there was no evidence to show that the large infectious disease hospitals exerted a bad influence on the surrounding neighbourhood, but much the other way. The windows of the Homerton Hospital, and the windows of the City of London Union Infirmary were parallel, and not very far apart, and yet no case of infectious disease had been communicated, although there were in the Union Infirmary parturient women and young children in a state particularly susceptible to infection ; he, therefore, considered that so far as the evidence went it pointed to the conclusion that the large hospitals did not, as hospitals, *per se*, spread infection in the neighbourhoods in which they were situated, and that on this all-important point that the large hospitals do of themselves spread infection, Dr. Richardson had not produced *any evidence*. With regard to the large mortality in hospitals this was due to the fact that the more severe cases were sent to the hospitals, whereas the milder cases were kept at home.

Mr. WYNTER BLYTH said that if Dr. Richardson's proposals were carried out at once it would relieve the local boards from a difficulty in which they were now placed, by having a number of cases of small-pox and not knowing where to send them. He thought that if we could get registration of disease, and a proper disease map compiled, it would be of great assistance to medical men. He agreed with the author, that every parish should bear the burden of its own sick, but under the present arrangement this was impossible. Respecting the danger attending the aggregation of cases of disease in large hospitals, the danger arose not so much from the buildings themselves, as from the number of callers, patients, ambulances, &c., brought into the neighbourhood ; and that this danger did not occur in the case of small hospitals, they had the best proof, as small hospitals had been practically tried in Marylebone in 1871 without causing any spread of disease. Dr. Tripe had given statistics to prove that large hospitals did have a baneful effect on the neighbourhood surrounding them, though he (the speaker) was not in a position to support this evidence by his own experience. With regard to the plan suggested by Dr. Richardson for small-pox hospitals, he thought it was decidedly novel, but he saw nothing against it.

Dr. McCOMBIE thought that hospitals were an assumed rather than a real danger to the neighbourhood. It was alleged that nurses carried infection out in their clothes. This, he thought, impossible, for during the past three years over 200 persons had been employed at the Deptford Hospital, and in only two instances had small-pox appeared in the homes of any of the staff. One case was in the family of a housemaid, and the other in that of an assistant-nurse,



and in neither case did the visits of these persons to their homes, and the occurrence of the cases of small-pox, show that they bore any relation as cause and effect. He had often transferred nurses from small-pox wards to fever wards, taking care that they put on fresh clothing, without any bad result ensuing. As nurses were obliged to change their dress before going out, and to wash their hands and face, he thought there was little, if any danger of their carrying infection to the neighbourhood. With regard to wards becoming leprous with continued use, as affirmed by Dr. Haughton, he had had a ward, occupied continuously for three years by small-pox patients, and a surgical case (excision of part of scapula) treated in it recently, recovered without any ill effects. In reply to the remark that the mortality was higher in large wards, in which all the beds were occupied, than in small wards, he would state the fact that the wards at Deptford Hospital were fuller than they had ever been before, and yet the mortality was less.

Dr. W. J. COLLINS commenced some remarks relating to vaccination, but the Chairman ruled that as he had carefully avoided introducing the subject of vaccination into his paper, any discussion upon it was out of order.

Mr. EMERY said that infectious diseases occurred chiefly among the poor, and he thought that the first consideration should be to improve the dwellings of the poor, and thus cut at the root of the evil.

He thought that compulsory registration of disease was too much of an inquisition, and not likely to be adopted, as it would injure small tradesmen and others who would lose their custom directly it was known that there was infectious disease in the house; besides, it was only the doctors who wanted this registration, because of the 2s. 6d. fee for every return made, which would amount to more than one hundred thousand per annum to the medical profession; the public would rather be without it. In his opinion hospitals, either large or small, were bad, and it would be much better to treat the patients at home, than to kill them by Act of Parliament. That is, by compulsory removal you endanger their lives and increase the mortality.

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The discussion was resumed on April 27th, Dr. B. W. RICHARDSON, F.R.S., occupying the Chair.

Mr. EDWIN CHADWICK, C.B., thought that the first step to be taken in dealing with small-pox or any other epidemic disease, was to make a thorough enquiry, without reference to pre-conceived notions, as to the results attending methods previously tried, and from the information thus obtained to see what would and what would not do, and then

carefully consider the best means to be adopted. This was the plan adopted at his suggestion by the first General Board of Health, in dealing with the attack of cholera in 1848; in the course of these enquiries they found that the removal of patients to hospitals was attended with great danger, and other facts which they discovered as to the general existence of premonitory symptoms, which had previously escaped notice, led to the establishment of a system of house to house visitation, to the immediate treatment of these premonitory symptoms, and to the abandonment, in this instance, of the former course of meeting epidemics by almost exclusive hospital treatment.

This house to house visitation and treatment was followed by such a marked decrease in the death rate that he (the speaker) could tell by looking at the daily returns which were sent to the Board of Health from the different places, whether the system was being properly carried out or not; and the success obtained was greater than had been obtained anywhere before. A statement was made at the Medical Congress, at Brussels, to the effect that when this system of house to house visitation had been adopted the loss to St. Petersburg by the visitation of an epidemic was reduced from £25,000 to £3,000. Not less than sixty thousand lives, it was estimated, had been saved in Great Britain by acting on the principles adopted by the Board. There was one great factor, he was convinced, of mortality in large hospitals, which had been overlooked: the psychological factor, the effect of terror on the mind in the view of the sufferings of assembled patients. Once when he had visited one of the finest hospitals, the best warmed, the best ventilated, the best lighted, and most cleanly and orderly, he could not but be appalled by one condition—the resounding agonies of the suffering patients. Who does not know the power of mental depression upon disease? Who does not know that the effects of announcements to patients that there is no hope of their recovery is to accelerate the fatal termination? He thought that the excessive mortality of large lying-in hospitals, as compared with the smaller workhouses, was due to this cause, notwithstanding the very inferior treatment at the workhouses. Dr. Mouat had lately been in Paris on a course of enquiry into the treatment of the sick; and he (the speaker) had learned from him that his conclusions are entirely corroborative of those propounded by Dr. Richardson against large hospitals.

The early house to house visitations enabled arrangements to be made for the separation of those who were well from those who were ill, and home treatment to be given very successfully, and the necessity for even small hospitals to be diminished to a greater extent than was imagined.

Mr. E. H. GALSWORTHY asked with what Mr. Chadwick compared his house-to-house visitation, with treatment in large hospitals, or with no treatment at all? He quite agreed with Dr. Richardson as to the benefits that would arise from a registration of disease, and he thought that it should be made compulsory. What we wanted was the expression of public opinion on the subject, and not only the views of

delegates at meetings and of societies. He did not agree that power should be given to any Justice of the Peace to order the removal of cases of infectious disease to the hospital, even where proper treatment could not be obtained at home. With regard to what the Chairman said in his paper, that friends go to and from the hospital, and it is impossible but that they should carry disease, he would say that the rules for the admission of visitors made this improbable, as they were very stringent. He thought that if the burden of providing for infectious diseases were thrown on the parishes, as suggested, that much more stringent legislature for providing accommodation would have to be passed to make the parishes do the work satisfactorily. The mapping out of special centres of infection, referred to in Section 5 of the paper, was done by the Metropolitan Asylums Board, but if the parishes would take it up the Asylums Board would certainly have no objection. He did not know why Dr. Richardson had chosen 24 as the most desirable number of patients to be placed in one hospital, for the medical conferences held at the time of the establishment of the Asylums Board had decided that large hospitals would be most suitable for the treatment of infectious diseases. Then, again, it would be almost impossible, with such small hospitals to get sufficient accommodation in the case of an epidemic, and it would be difficult to keep them always ready, even though very desirable. The suggestion of placing them on the tops of houses he thought altogether impracticable, as difficulties would arise with ground landlords, architects, &c., &c. Many of the speakers had said that the mortality was greater in large than in small hospitals, but he did not know where to find any statistics to prove this statement. The argument that large hospitals may be a nuisance to the neighbourhood does not necessarily prove that they need be. He agreed that some further legislation was necessary, as it was quite impossible for the Asylums Board to carry out its duties without more power being given to it.

Dr. ARCHER FARR thought that the question to be considered was, in what way hospital accommodation could best be provided for the infectious sick; whatever might be said in favour of home treatment of infectious diseases, hospitals would always be necessary, and that more especially under a system of compulsory notification of infectious diseases, which will soon probably become law. If infectious hospitals could be so arranged as not to be a danger to the neighbourhood, one great difficulty of the Asylums Board would be removed; and he thought that in the present advanced state of sanitary science, it ought to be possible to construct hospitals that were not open to objection on this ground; he agreed with Dr. Richardson's plan for small hospitals, but suggested larger hospitals, arranged in blocks, each block to contain only 24 patients. He suggested also that the ambulance used for the conveyance of patients should have no side windows, but be lighted and ventilated from the roof, and that it should be made sufficiently large to carry away the bedding along with the patient. The ambulances should contain a separate compart-



ment for an attendant, so arranged as to admit of the patient being kept in view during the journey to hospital: when not in use it would be better to keep the ambulances at the hospital. There was one point which he thought had been overlooked with regard to small-pox, and that was the power of the infection to strike at a distance from the source in which it might arise.

Mr. H. H. COLLINS, F.R.I.B.A., said that with regard to the compulsory notification of infectious diseases, the matter had been recently brought before Mr. Dodson, by an important deputation, of which he was a member. Mr. Dodson, after hearing the views set forth by the deputation, remarked that it would be useless to make registration compulsory unless arrangements were made for the reception of patients suffering from infectious diseases; this underlies the whole matter, and is one of the principal difficulties in the way of rendering legislation on this point effective.

The sanitary authority for the Parish of Paddington had proposed to build an infectious disease hospital, somewhat on the plan proposed by Dr. Richardson, about 20 miles from London. If, as had been stated by several medical gentlemen, the removal of a small-pox patient during the first three days of the illness was not prejudicial to the patient, nor calculated to create infection to the surroundings, such an arrangement would be a step in the right direction. Mr. Galsworthy might be right as to large hospitals not being a nuisance despite the decision with regard to that at Hampstead, but there could be no doubt that a hospital for infectious diseases materially depreciated the value of property in its neighbourhood. Sir John Rose Cormack, M.D., read a paper at the last conference of the Social Science Association, in which he pointed out how, in the year 1879, an outbreak of small-pox had been created through the use of a building in the Rue de la Révolte as a temporary hospital.

He attributed the spread of the disease to the action of the wind blowing the epithelial scales through the windows, and carrying the infection into the houses on the side of the street opposite to the hospital; and in his paper he narrates several instances of the spread of diseases caused by infectious hospitals being situated in the midst of teeming populations; on the other hand one could not fail to notice that many of the fever and small-pox hospitals had had houses built close to them, notably the Stockwell Hospital, in which the yards or gardens of the houses looked on to the recreation grounds of the convalescent small-pox patients. The plan suggested by Dr. Richardson, however delightful in theory, would be very difficult to carry out in practice, both as regards legal considerations and details of construction.

There was one point which required grave consideration: there was no doubt that if the registration of infectious diseases were made compulsory the class of people who live in model lodging houses and artisans' dwellings, such as the Peabody Buildings, &c., would, in a great measure, desert these buildings, and would strongly object to



the supervision and isolation to which they would be rendered amenable in the event of an infectious disease attacking any member of their family; they would probably never consider themselves safe from the interference of the medical officer of health or his deputies; many of them would resist the inquisitorial nature of the proceedings, and would probably deprive themselves of medical assistance in order to prevent the knowledge of the infectious character of the disease becoming known to the authorities. This is a point which would have to be well considered and guarded against if the proposed act were meant to be effective, and great care would have to be exercised in carrying out its provisions with tenderness and consideration. At Edinburgh he was led to believe the system proposed had been very successful; but of course it was one thing to apply an act to a small city like Edinburgh, and quite another to a leviathan Metropolitan City, such as London.

Mr. BRIDGWATER said that the state of facts as to the Fulham Hospital confirmed the views so ably expressed by Mr. Pearson Hill with regard to the injurious effects of large hospitals upon the immediate neighbourhoods; they intensified the disease within a certain radius, outside which, it decreased in a marked ratio, though no place could now boast of an entire immunity. The transit of patients was in itself a source of contagion anywhere and everywhere, but all the evils were centralised at the hospitals themselves.

There was antagonism, but no hostility, to the Asylums Board; they were only asked to be reasonable and to listen to advice, and that they had in the able paper read by Dr. Richardson, under the auspices of this Society, and its introduction was very opportune.

It would be hopeless to expect unanimity of opinion upon such a subject, but he would remark that in close connection with the medical treatment of small-pox, and fevers generally, is the injustice of the incidence of these large hospitals; that they are an evil in themselves had been proved to demonstration, and that they conduce to a greater mortality amongst the patients may be accepted as a fact.

Hampstead had been successful in closing the hospital there, and the health of the immediate district had improved. Fulham hoped to obtain similar relief; meantime every district in its turn rebelled against the introduction of even temporary shelter for the surplus cases of the present epidemic, so anxious did all seem to impose their burdens upon others.

To inflict the country, or the suburbs of London with Metropolitan impurities was cowardly and inhuman; and in the matter of transit the points of convergence would be centres of disease. He understood Mr. Galsworthy and others to contend that they were dealing with a governable evil. Hospitals, they said, could be made non-contagious: that being so, a very simple remedy presented itself, which would have the special advantage of making each parish responsible for its own sick. Let each of the thirty-nine sanitary districts of the Metropolis provide say twenty-five beds at its workhouse, if in the parish, and if not, then on some convenient site within the parish.

The evils of transit would be minimised, and there would be less parade of the disease in the streets. A chance excess of cases at one place might be passed to the next nearest hospital without rateable disturbance, the cost would be on the common poor fund, and not upon the local rates, and pauper and non-pauper cases could be accommodated. This was very much in accord with the proposals in the paper, and he regretted that the rules of the Institute did not admit of a resolution being moved in general support of it.

Mr. H. SAXON SNELL, F.R.I.B.A., said it was true that the guardians of the poor had power to purchase land adjoining any workhouse existing at the date of the Poor Law Act of 1867; but when it was considered how enormous was the value of land in the midst of the most densely populated parishes of the Metropolis, it was hardly likely the authorities would take advantage of this power for the creation of local small-pox hospitals; and he could not see the necessity for their so doing, for it was shown very clearly by the plan produced by the previous speaker, that the small-pox hospital at Fulham certainly did communicate disease to the surrounding neighbourhood, and that the number of cases of small-pox in the neighbourhood decreased as the distance from the hospital as a centre increased. To dot small-pox hospitals about various parts of London, as proposed, would be simply multiplying these infectious centres for the radiation of disease.

Dr. F. R. BERNARD, called attention to the fact that, although several speakers had remarked upon the excessive mortality in large hospitals, none had given the mortality in small ones. The mortality in Stockwell hospital (102 beds), during 1880, was 12·9, and this would be considerably decreased if the deaths occurring within 24 hours after admission were deducted. With regard to the registration of infectious diseases, he considered this should be compulsory, and the householder or head of the family should forthwith report to the sanitary officer of the district any infectious case, enclosing a certificate from the medical attendant to the effect that the case could (or could not) be treated where it then was without danger to the other inmates and the neighbourhood; if likely to be detrimental, instructions should be given for the removal of the patient, and for the disinfection of the premises, and a strict enquiry instituted as to the presumable source of infection, as cases cropping up year by year from the same house and street, seem to indicate that the *fons et origo* has not been found out and removed.

He maintained that there could be no harmful aggregation (he used Dr. Richardson's own word) of patients suffering from small-pox, in a properly-constructed hospital, the wards of which had the proper cubic space, and where the hospital site was judiciously chosen. The question of site and surroundings was, he said, too large a one to enter into at present.

The question of parishes or unions in the metropolitan area managing their own infectious sick was also a great question; and, in his experience the parish authorities were only too pleased to send their sick

to the hospitals of the Metropolitan Asylums Board. There were few parishes or unions where suitable sites could be acquired, and parishioners were generally in a hurry to send infectious cases out of their midst.

It appeared to him that much valuable time would elapse before any given parish could acquire the information mentioned as necessary under the sixth head of the Paper; and with regard to Dr. Richardson's idea of small hospitals for 24 patients only, the Parish of Lambeth and the Union of Wandsworth and Clapham would during an epidemic require at least three such hospitals for small-pox only. Boards of guardians would hardly be likely to go to such expense when there appeared no necessity for it.

There appeared to him grave objections to the suggestions given under heads VII., VIII., and IX., among which might be mentioned: 1st, expense; 2nd, difficulty in getting proper nursing; 3rd, medical superintendence, &c., &c.

He contended that small-pox need not, and did not spread from properly-constructed and well-managed hospitals; and that such hospitals were not sources of danger to the neighbourhood: if this were so, however, he contended that the small hospitals would be equally, if not more dangerous, and their multiplication would also greatly increase the risk.

The discussion was again resumed on May 18th, Dr. B. W. RICHARDSON, F.R.S., occupying the Chair.

Mr. PEARSON HILL, who stated that he was a member of a committee which for many years had been engaged in watching the effect on the surrounding population of a huge hospital for small-pox patients, said that if any persons of average intelligence examined into the admitted facts of the case, they could, he thought, hardly fail to come to the conclusion that there was something faulty in the present method of dealing with small-pox epidemics in London. The Asylums Board for ten or twelve years had had almost unlimited power to do whatever it thought best; it had spent about a million sterling of the ratepayers' money, raised by loan, in addition to the tens of thousands expended annually for the Board's current expenses, and yet, with all these great advantages of boundless means and opportunity, so far from having succeeded in "stamping out" small-pox, the deaths annually from that disease in London since the establishment of the Board had been on the average about twice as numerous as they were before.

Even if the Board were allowed its somewhat extraordinary claim, to strike out from the account against it the year of its greatest failure, viz., 1870, the average number of deaths from small-pox in London every year would still be found to be considerably greater since the establishment of the Board than previously, showing that so far



as London was concerned something, yet to be explained, had counter-acted all the benefits it ought to have derived from the advance in medical science, the improvement in sanitary knowledge, and the clearing away of "rookeries" and other unhealthy dwellings which had taken place in the last ten or twelve years.

This bad pre-eminence of London was also strikingly shown by the Returns published weekly by the Registrar-General. These Returns showed that small-pox, in proportion to population, had, during the last three years, been eighty times as fatal in London as in the nineteen large provincial towns which, in the aggregate, had a somewhat larger population than London itself. Indeed, since 1877, small-pox had practically died out in Liverpool, Manchester, and the other large towns, but continued with unabated violence in London.

This unfortunate state of things in the Metropolis appeared to coincide with the establishment of the Asylums Board, and he (Mr. Hill) suggested that if it could be shown that the Board, instead of following established precedents, had adopted some entirely new method of dealing with small-pox patients, it might reasonably be inferred that these disastrous results were attributable in some measure to the Board's innovations.

Now prior to the establishment of the Asylums Board the present gigantic hospitals in which 400 or 500 small-pox patients were crowded together were things unknown in this country. The largest Metropolitan hospital for small-pox patients then existing was that at Highgate, where, on about twelve or fourteen acres of ground, in a well isolated situation, a hospital had been erected for about eighty or one hundred patients, giving an average of seven or eight patients to the acre; but at Hampstead the Asylums Board selected a site of about seven or eight acres of land—not isolated, but in close proximity to a densely-populated neighbourhood—and had put on the site, not fifty or sixty patients, which would have been the same proportion as at Highgate, but 560 patients; in other words, the patients were packed ten times as closely as they had ever been packed before, and yet a good result was expected!

He (Mr. Hill) proceeded to show what were the consequences of this departure from established usage. In 1870, when the Hampstead hospital was opened for small-pox patients (though in the rest of London there were more than 2,000 cases awaiting treatment) not a single case of small-pox was known in Hampstead; but within a month of the opening of the hospital the disease broke out and concentrated itself with great severity in the houses adjoining the hospital. In one of these streets, containing about sixty-six houses, there were no less than eighty-eight cases of small-pox.

The second small-pox epidemic of 1876—8 gave similar results.

The hospital was re-opened in November, 1876. At that time the other hospitals of the Asylums Board were full of small-pox patients—and again Hampstead was free from the disease—but in less than three weeks after the opening of the hospital, small pox broke out in Hampstead and again concentrated itself in the neighbourhood of the hospital.



Within a belt 300 yards wide surrounding the hospital, which belt contained about one-sixteenth of the parish of Hampstead, there were (between November, 1876, and August, 1878,) no less than fifty-one cases of small-pox, while in the remaining fifteen-sixteenths of the parish there were but fifty-nine cases. A comparison of cases with population, showed that in the poorest and most squalid part of the parish there were to each 3,000 inhabitants about seven cases of small-pox. In the good parts of the parish there were to each 3,000 inhabitants about four cases, while in the neighbourhood surrounding the hospital—a district admitted by the Chairman of the Asylums Board (Dr. Brewer) to be one of unusual natural salubrity—there were amongst its 3,000 inhabitants no less than fifty-one cases of small-pox. The amount of disease round the hospital, in proportion to population, being more than twelve times as great as in the rest of the parish.

In the two years which had now elapsed since the Hampstead hospital was closed by injunction, there had been very few cases and only one death from small-pox in the parish: a degree of healthiness which would only be equalled in London generally when the deaths from small-pox in the whole Metropolis amounted to only one per week.

He (Mr. Hill) then stated that this experience of the spread of disease from the hospital at Hampstead, was by no means peculiar, as similar results had followed the use of the other hospitals of the Asylums Board, and had also obtained in Paris and elsewhere—that in every instance (ten in number) in which the effect of these large hospitals for small-pox had been carefully investigated, it had been found that small-pox broke out in the surrounding houses and prevailed to an extent far exceeding what was due to the number of the population. This absolute uniformity of result proving that the excessive amount of small-pox in the neighbourhood of the hospitals could not be the result of mere chance or accident.

He then showed by statistics that not only did disease spread from the hospitals, but—if the statements made at the previous meeting by officers of the Asylums Board were correct—that it spread in a far more virulent form, and suggested that possibly small-pox became intensified when large numbers of cases were aggregated together, just as hot cinders, when heaped together, made a raging fire, but, when separated, soon cooled down.

He reminded the meeting that while all these evils in the second epidemic were falling upon Hampstead, the Asylums Board knew the trial was hanging over its head; it took, as is known, special precautions to prevent the spread of disease, and yet failed to do so—proving that under even the best of its management, the hospitals were so conducted as to be a danger to the public. He expressed his surprise to hear that Dr. Collie, the superintendent of the Homerton Small-Pox Hospital, had, at the meeting, in April, when Dr. Richardson's paper was first discussed, expressed an opinion that disease did not spread from the hospitals, as Dr. Collie's own paper on the dangers of small-pox hospitals, which he read before the

Society of Medical Officers of Health, and published in the *Medical Times* of 5th and 12th June, 1880, showed that at that time he held a totally different opinion.

He pointed out the fallacy of Dr. Brewer's argument, repeated in a letter recently published, that because the death-rate of all Hampstead was not very high, the parish had not suffered by the hospital. This same fallacy he stated was brought forward by Dr. Brewer and exposed in the "Joint Reply" issued by the Hampstead Committees as far back as December, 1874. Hampstead parish contained between three and four square miles, and about 40,000 inhabitants, the vast majority of whom lived far away (some of them miles away) from the hospital, and were, of course, unaffected by it, as its evil effects were necessarily confined almost entirely to the small portion of the parish (one-sixteenth part) immediately adjoining. Indeed, to take an extreme case, every one of the 3,000 inhabitants living near the hospital might have caught the disease, and had the usual per centage of deaths (600) without raising the mortality of all Hampstead by more than one and a half per cent.

He stated that more than ten years had elapsed since the attention of the Local Government Board and Asylums Board was called to the terrible spread of disease from the Hampstead hospital, but that even to this day the managers seemed to think it unnecessary to make any real enquiry into the matter. They seemed to shut their eyes to all facts but those they wished to see.

He next alluded to the great mortality which prevailed in the large hospitals of the Asylums Board. More than eight years ago Dr. Gibbon, health officer of the Holborn District, taking as a basis the results in about 700 small-pox cases which had come under his own observation, showed that the mortality amongst patients sent to the hospitals of the Asylums Board, was twice as great as amongst patients treated at their own homes, and six times as great as amongst those treated in small infirmaries attached to their own parishes. Now, if Dr. Gibbon's statement and inference were correct, it would follow that at the Hampstead hospital alone, more than 1,000 lives had been needlessly sacrificed by a blind adherence to the plan of aggregating together large numbers of patients.

The Asylums Board had had more than eight years in which to investigate this most serious charge against its management, but contented itself with "pooh-poohing" the statement, and declaring that it did not know where to find any evidence bearing on the question.

He maintained that facts vouched for by Dr. Gibbon (and which were, moreover, in accordance with the admitted excessive mortality from small-pox in London) were more trustworthy than mere vague denials from the managers, which denials were admittedly based on their ignorance of the facts. He pointed out that the evidence lay plainly before the Board whenever it cared to make enquiry.

With regard to Dr. Richardson's plan for small hospitals in each parish he thought, however good it might be in theory, it had one great difficulty to overcome—viz., the opposition it would encounter from every

one living near them. And on the principle that it was sometimes wiser to attempt that which was practicable, rather than to strive for something really better but not to be had, he suggested whether a ring of smaller hospitals (similar to that at Highgate) might not be established round London, sufficiently far a-field to be away from inhabited houses—one hospital to each parish, though not situated in each parish—in which small-pox patients could be safely treated—following, in fact, the example of the St. Pancras and Islington Vestries, which had, he was informed, secured, near Finchley, about 25 or 30 acres of agricultural land on which to place a properly isolated hospital.

Of course such a plan might be objected to on the ground that it would increase the danger to patients by the longer journey, and to the public at large through the greater chance of spreading disease from the ambulances, but he thought these difficulties were not insuperable. He had been assured by high medical authorities that with properly constructed ambulances the additional distance could be accomplished without risk to the patient—while as regards the danger to the public, the experience gained at Hampstead tended to show that under the present system there were two dangers: one, which he would call the terminal danger, *i.e.*, the risks of spreading disease from the hospital itself, or from the patient, nurses, or attendants, when the former was being lifted out of the ambulance, or from persons passing in and out of the hospital gates. The other danger—the danger of transit—was the risk of the patient spreading disease as the ambulance went along, and that danger might, perhaps, be somewhat increased by increased distance—but in his opinion, if the danger of transit be expressed by one, the terminal danger should be expressed by 100; and if this great danger could be abolished, as it would be if there were no people living near the hospital, an increase of the smaller danger might wisely be encountered; but he was of opinion that even this might be reduced, rather than increased, if patients were taken either at night, or very early in the morning, when not only the streets would be empty, but all houses—public as well as private—closed.

Finally, he (Mr. Hill) strongly urged the vital importance of entrusting the care of the sick poor of London to some more competent Board. The failure of the present system was, in his opinion, in great measure attributable to the fact that the Asylums Board was an unpaid Board, so that no medical man of any reputation could afford to give up his time to its affairs. Though there were, doubtless, exceptions to the rule, it might almost be taken as an axiom, that services given for nothing were generally good for nothing, and though, at the beginning, many eminent medical men generously gave their services to the Board, after a little while they one by one left it, and had been succeeded by members who were less capable, and it seemed to him, that to expect a set of gentlemen who had been elected to the Board, as a rule, quite irrespective of their possessing any special qualification for the post, to be able successfully to deal with a great question of medical science, was almost as wise as it would be to expect them



successfully to carry on the duties of the Astronomer-Royal at the Greenwich Observatory, or to undertake the judicial functions of the House of Lords.

Prof. CORFIELD did not at all agree with the outcry against large hospitals, nor with the idea of a small hospital for each parish. He considered that there was no evidence to prove that the mortality in large hospitals was greater than in small ones. The large mortality in hospitals was due to the number of unvaccinated cases, and to the fact that the worst cases were sent there. He considered that there was not the smallest evidence to prove that fever hospitals were any danger to the neighbourhood; not a single case of fever has ever been traced to the London Fever Hospital; and he wanted a great deal more evidence to satisfy him that small-pox was disseminated in the neighbourhood of the small-pox hospitals. He did not see that it was a parish affair to provide accommodation for small-pox patients; no other hospitals were organised by the parishes; and if hospitals were a danger, the danger would be increased by having forty hospitals. It was, he thought, quite unnecessary to require the local authorities to have accommodation ready at all times for the reception of patients. In the parish for which he was Medical Officer of Health (St. George's, Hanover Square), they had had some ground offered to them on which to build a hospital, but he had advised the authorities not to accept it.

Dr. WILLOUGHBY could not agree with Mr. Hill in his censures on the system adopted by the Asylums Board, still less could he admit that the hospitals played any considerable part in the recent prevalence of small-pox in London, the causes of which must be sought elsewhere. At the same time he differed decidedly from Dr. Corfield, who denied that they were sources of local danger. As they were at present managed the evidence of Dr. Tripe and others proved beyond the possibility of doubt that they were local foci of infection, but this he attributed to the gross neglect of precautions, of which Dr. Tripe and Mr. Hill had given examples. The entire immunity of the inmates of the City of London Union—parturient women and unvaccinated infants—though its open windows were but ninety feet from those of the Homerton Small-Pox Hospital, proved that in themselves they might be as innocuous as the Fever Hospital at Islington was well known to be.

It was, he argued, idle to talk of the *concentration* of the poison by the aggregation of cases when each had an allowance of cubic space vastly greater than could be enjoyed in the best of private houses.

He thought the plan of hospitals suggested by Dr. Richardson was impracticable, especially with regard to the carrying of all out-going air through fire; adequate ventilation under such an arrangement could not, he believed, be attained without producing a painful draught. He would rather have larger hospitals for each great parish or union, constructed after the admirable design which Dr. Collie laid before the Society of Medical Officers of Health.



Mr. HEMPSON DENHAM did not at all approve the idea of removing small-pox hospitals into the country. He considered that the inhabitants of a town had no right to send bad cases of infectious disease into pleasant country places. He suggested that a fleet of ships should be moored at the mouth of the Thames and made into a floating hospital for the treatment of such cases.\* He did not think that placing small hospitals on the tops of houses would meet the requirements of London or of the country. But what was most wanted to successfully deal with infectious diseases was an improvement in the sanitary condition of London and towns generally, so as to remove the conditions favourable to the development of those diseases.

The following letter was read from Dr. Tripe, Medical Officer of Health for Hackney:—

“DEAR DR. RICHARDSON,—I write in accordance with your request to express my strong conviction that large hospitals for the treatment of small-pox are very objectionable, as they apparently spread the disease in their vicinity. The same objection, however, does not apply to scarlet fever and typhoid, if the experience obtained in this district is to be taken into account. I send herewith a summary of the statistics I have prepared for this district, but it must not be supposed that I consider the whole or nearly the whole of the large mortality near the hospital to have arisen from unavoidable causes, as the accompanying report will show. I believe that if there be good approaches to a hospital; if the wards, laundry, and dead-house are not within at least 100 feet of the outer walls surrounding the premises; if the stores and dwellings of the medical officers and steward are so placed as to be entered from the road; and the surrounding walls are say ten feet high, but a small mortality, if any, should be engendered by the hospital. The chief danger, so far as my experience goes, arises from carelessness of the ambulance drivers, insufficient disinfection of the ambulances before their return from the hospital, and especially from visitors to the patients. I also object to too many patients being allowed to an acre, and to the buildings being too close together: the present allowance of fifty patients to an acre is, I think, too large. If there was one hospital to each Metropolitan borough, with a reserve piece of ground on which double bell-tents or huts could be placed, if necessary, in each of the four great divisions of the Metropolis, *i.e.*, North, South, East, and West, I think the necessary requirements of London would be provided for. Of course the law would have to be altered to enable the managers to erect and maintain the hospitals in situations approved by the Local Government Board, or some other responsible authority.

Sincerely yours,  
JOHN W. TRIPE.”

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\* The Government afterwards adopted this suggestion, and provided vessels for the purpose.

## REPORT AND SUMMARY ACCOMPANYING DR. TRIPE'S LETTER.

STATEMENT PREPARED BY DR. TRIPE OF THE DEATHS FROM SMALL-POX IN HACKNEY DISTRICT, 1871-80 AND 1861-70.

In Albert Street, Brooksby's Walk, College Street, College Lane, Farm Place, Holmbrook Street, Templar Road, and the Grove, being the streets nearest to the Small-Pox Hospital, the deaths from small-pox amounted to 95 in ten years amongst 2,314 people, and there were also 277 cases reported to me from these streets. These deaths give an annual death-rate of 4.1 deaths per 1,000 population. In the streets within a quarter of a mile radius in front and at the sides of the hospital, there were 167 deaths, and 625 cases reported in the ten years amongst a mean number of 6,823 inhabitants, giving an annual death-rate of 2.45 persons per 1,000 population. Amongst 30,171 residents of the other small houses occupied by poor persons which are inspected annually, after deducting the deaths in and population of the above-mentioned streets, there were 484 deaths and 1,745 cases, which give a death-rate of 1.6 deaths annually per 1,000 population. The death-rate from small-pox amongst 119,400 residents in the rest of the district was only 0.21 per 1,000 population per annum, 261 deaths only having been registered amongst them in the ten years. The death-rate was 0.58 per annum per 1,000 population for the whole district. These figures are necessarily calculated on the deaths as cases in respectable houses are rarely reported to me, and the calculations would consequently be misleading. If all the deaths in hospitals assigned to Hackney, or for which no addresses are given, had been included, a larger per centage of deaths in the poorer streets would have been shown. I was unable to assign 53 deaths in hospitals to the localities from which the patients had been removed, as their place of abode was not stated. The cases per 1,000 population per annum in the ten years were as follows:—In the streets around the hospital, 12.0; in those within a quarter of a mile radius in front and at the sides, 9.2; in the other small houses, 5.8 per 1,000 population. The number of deaths from small-pox in 1861-70, after allowing for those removed to the Highgate Hospital, was 173, which gives an annual death-rate of 0.167 per 1,000 for the whole district. There were 15 deaths within the quarter-mile radius, which, with 3 added for the proportion of residents removed to Highgate Hospital, give 0.264 per 1,000 population against 2.45, or nearly ten times as many in 1871-80 as in 1861-70. The proportion of deaths in the quarter-mile radius in 1861-70 to the total deaths from small-pox in this district was 10.4 per cent., whilst in 1871-80 it was 18.3 per cent., showing that as compared with the rest of the district the inhabitants of these streets suffered to a much greater extent in 1871-80 than in 1861-70.

SUMMARY :		Cases of, and Deaths from Small-Pox in the Streets situated within a $\frac{1}{4}$ -mile radius of the Small-Pox Hospital, Homerton.					
Hackney 1871-80 and 1861-70.		Name of Street.	Population.	Cases, 1871-80.		Deaths.	
1871-80.	Per 1000 Population.			1871-80.	1861-70.		
95 deaths in streets adjacent to the Hospital...	4.1	Albert Street, Homerton	131	15	6	0	
164 deaths in streets situated within a $\frac{1}{4}$ -mile radius of the Small-Pox Hospital .....	2.45	Bridge Street "	146	14	2	0	
484 deaths amongst 30,077 poor persons living in other small houses	1.60	Brooksby Walk "	500	55	16	1	
261 deaths amongst 119,400 population, excluding poor population and deaths .....	0.21	Churchill Road "	364	35	9	0	
912 deaths (addresses known) amongst total population .....	0.58	Church Road "	287	17	3	0	
965 total deaths amongst Hackney residents, including unknown addresses .....	0.64	Church Terrace "	115	15	1	0	
		College Lane "	91	12	1	1	
		College Street "	173	13	5	0	
		Cross Street "	71	9	4	0	
		Crozier Terrace "	428	18	6	1	
		Digby Road "	602	31	5	1	
		Farm Place "	91	8	3	0	
		Fenn Street "	68	5	1	0	
		The Grove "	198	29	10	0	
		High Street "	1196	51	13	2	
		Holmbrook Street "	559	79	25	7	
		Homerton Row "	36	6	3	1	
		John Street "	127	10	2	0	
		Marion Street "	120	27	6	0	
		Nesbitt Street "	440	26	2	0	
		Plough Lane "	65	10	3	0	
		Rosina Street "	128	32	9	0	
		Sedgwick Street "	316	42	3	0	
		Templar Road "	571	66	29	1	
		Total .....	6823	625	167	15	
						addresses not known	
						3	

NOTE.—The Hospital was not open during any part of the 10 years—1861-70.

NOTE.—The Hospital was not open during any part of the 10 years—1861-70.

Dr. RICHARDSON replied: The Discussion that has been carried on resolves itself into the following points:—

I.—I think that it may be fairly conceded that all are agreed as to the propriety of obtaining a complete registration of the communicable diseases.

II.—It seems to be an equal matter of agreement that the sanitary committee or local authority in every parish should have all the special centres of infection in its district thoroughly mapped out, and that it should know the actual accommodation that is required for its infectious sick from time to time.

III.—The suggestion that every parish should bear its own burthens and accept its own responsibilities for the management of its infectious sick within its own boundaries seems to be freely

admitted as sound and purely just. The argument used against it is that it is not practical: to that I answer, in a word, that, if it be practical to retain and treat infected people within the boundaries of four or five parishes, it is practical in all.

IV.—It has been urged that in large hospitals the management of the sick is not objectionable. The able superintendents of the large institutions are the chief supporters of this view. It has been insisted on by at least an equal number of speakers on the other side that the bringing together of a number of persons in a ward is not consistent with the most successful treatment. Mr. Chadwick has spoken specially on this point, and supported my thesis as to the serious psychological evils which attend this method. I have heard nothing that would lead me to retract a word I have said on the subject. I do not agree with Dr. Collie's statement that the great mortality in small-pox hospitals is accounted for by the fact that all the worst cases are sent there. The class of cases I have seen in private consulting practice has usually been of a bad type, and in fact the cases that, of all others, required to be relieved from surrounding influences of a depressing kind. From my point of view, the personal isolation of the sick is one of the most effective means of cure in such cases. It is these cases that should not go into a ward with others. Admitting (as all must who know how successful actual out-door treatment of infectious diseases is) that sufficient cubic space for each sick person is essential, that does not meet the necessity, equally essential, for individual isolation.

V.—The view that the large small-pox hospital is injurious to the surrounding neighbourhood is contested most earnestly by Drs. Collie, McCombie, and Corfield. They are met by Dr. Archer Farr, by Mr. Bridgwater, Mr. Pearson Hill, and by Dr. Tripe, who all give counter facts. The figures given by Dr. Tripe, the Medical Officer of Health for Hackney, read to me as unanswerable. He shows us that during ten years the proportion of deaths from small-pox in the streets near the hospital to which he refers was 12, within a quarter of a mile radius 9.2, and in other small houses, more remote, 5.8 per 1,000 population. Mr. Bridgewater's and Mr. Pearson Hill's facts are in the same direction.

VI.—Objection is taken to my plan of dealing with those small-pox patients in a district who have no home. The plan is said not to be practical, but it exists in practice already. In private houses we send the small-pox sufferer to the top room of the house; we isolate there, and we treat, notwithstanding the existing faulty arrangements, with success. London at this moment is, in fact, a badly managed upper floor hospital, even



now to a considerable extent. I say carry that plan out on a better scale for the poor who suffer, by making a sufficient number of small efficient upper floors. There are thirty-nine vestries concerned; for argument's sake, divide equally. Let each vestry, on its boundaries, set up four hospitals of light construction on the upper floors of existing or of new buildings. Let each hospital take in twelve patients. Then there would be accommodation for 1,872 patients; and if by a mutual accommodation between parishes one would receive for another in emergency, the whole question of dealing with the out of home infectious cases in London would be solved. Such small hospitals would not even be noticed after a time, and their management would be so easy that they could not be sources of danger if any efficiency deserving the name, were bestowed upon them.

VII.—To the last objection to my proposals, that if they were legislatively carried out the sick would not receive the highest medical care, I reply—only carry them out, and the medical care is sure enough. It would be as easy to secure the best consulting skill that medicine can afford for the small as for the large hospitals.

Dr. Richardson illustrated his observations by showing a very excellent model of a small iron hospital, arranged for destroying organic emanations by fire, constructed by Mr. Thomas Veryard, of 3, St. Andrews, Wandsworth Road.

A cordial vote of thanks was passed to Dr. Richardson for his valuable paper. The proceedings then terminated.

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# THE PRESENT STATE OF THE SEWAGE QUESTION.

BY PROF. CORFIELD, M.A., M.D. OXON., F.R.C.P. LOND.,

*Read June 21st, 1881.*

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There can be no doubt that the question of the removal of refuse matters from the vicinity of habitations is, and always has been, one of the most important of sanitary questions. In every large community where we find a slow removal of refuse matters of human beings, there we find a high death-rate, and wherever we find improved means for speedy removal, there we find a proportionately lower death-rate. This was shown to be the case, in a remarkable manner, by the researches of Dr. G. Buchanan, published in the ninth report of the Medical Officer of the Privy Council; in every town where the refuse matters had been removed more speedily, the death-rate was lowered; not only the general death-rate, but the death-rate from enteric fever and cholera, which are spread especially by this means. Before this, it had been noticed that cholera spread in filthy places; many witnesses before the Health of Towns Commission gave the most definite evidence that cholera spread wherever filth was kept, where the removal of refuse matters was not carried out thoroughly and quickly. The same was found to be the case in the time of the black death of the fourteenth century. If we read the accounts given of the streets and the houses at that time, we shall not wonder that the black death spread as it did; so it was with the Oriental plague in succeeding centuries. The fact that the Oriental plague now no longer appears in Europe, there can be no doubt, is due to the improved sanitary condition of the various towns in Europe. The fact that Constantinople is no longer a hot-bed of Oriental plague, is put down as due to the improved sanitary condition of that place. I think there can be no question but that several of these plagues of the middle ages, of some of which we know very little, spread more especially on account of the non-removal of filth. This is a fact, the importance of which has only been recognised during the last few years. I was very much struck by a remark that Dr. Acland

made to me the other day upon this subject; he said, "What do you think was the cause of the depopulation of so many of the cities of antiquity? I think it was pestilence rather than war," and I think there can be but very little question when you read the accounts. Why! the black death not only decimated towns, but almost entirely depopulated whole places, so that large and populous towns were left little straggling villages. I think you will be disposed to agree that it is not unlikely that many of the great cities were entirely depopulated in this way, and were lost, so that in some cases even their site is not known.

Having said thus much on the importance of the removal of refuse, I need hardly perhaps say that in the consideration of refuse matters, removal is the most important matter; they spread diseases in various ways, and the first thing we have to contend with is their removal. We want to get rid of them, and after we have got rid of them we may consider what we can do with them. As to the value of human excreta as a manurial substance, various authorities have put it at various sums, but an amount that is very usually accepted is, that the liquid excreta of an individual are worth 7s. 3d. a year, and the solids 1s. 3d., making together 8s. 6d. The amount given by Messrs. Lawes and Gilbert is 6s. 8d. Probably these are both too high values, when you put the matter to a practical test. Scarcely any manure will sell in the market for what it is theoretically worth in the laboratory. Dr. Voelcker, in his remarks on the value of farm-yard manure, comparing it with the value of artificial manure, gives his decision that it is worth about one-third of what is theoretically given to it in the laboratory.

There are, and always have been, a very large number of people who put the cart before the horse in these matters, who try first to see how much they can make out of this refuse matter, how much money they can save to the rates; that is the first thing they consider, and they put the first and most important thing second. Now that is a very great mistake indeed. The first thing to do with these refuse matters is to get rid of them; they are a nuisance, they cause a high death-rate. When we have got rid of them, then we may try to utilise them, and to make money out of them, but not till then. Now we come to the methods by which these matters are being dealt with. I shall divide them into two kinds. The first are commonly called the "conservancy" methods; they are called so, curiously enough, by their friends; I think it is a name that might have been given by their enemies, for of all things, *conservancy* of these matters is what we do not want. The second kind is the water-carriage system. There are really only these two methods.

The methods of conservancy or dry-carriage are of two sorts;

the first being simple methods by which these matters are collected in or about habitations without any admixture whatever, and the second when these refuse matters are mixed with various substances to absorb their moisture, to deodorise, or to disinfect them. The simplest form in use even now is to dig a hole in the ground and let the refuse matters fall into it. It was formerly thought that as much of the refuse matters should soak into the soil as possible, and it was not thought necessary to remove them. It was even thought a good plan to dig down till a spring was struck, when the top might be closed up permanently, as there was never any cause to empty the pit. I need not dwell upon this method, as it is now universally condemned. The improvements upon this method have been of two kinds; first, the receptacle was made impervious to water, and second, it was made gradually smaller and smaller, so that less and less of these refuse matters could be kept about. These improvements have clearly brought the matter more within the scope of sanitary law, and brought things into a more healthy state. These receptacles were made water-tight, they were ventilated, and they were reduced in size, until they came to a mere pail or tub placed under the seat of the closet, and which could be removed once or twice a week.

The system of collecting refuse matters in large water-tight ventilated cesspools underneath houses is a matter which must not be disposed of in a word, because it is a system largely adopted in the present day, both here and in many large cities on the Continent. A variety of devices have been invented for emptying the contents of these water-tight cesspools. In former years they used to be emptied by hand, bucket, and spade, and the results were very disastrous. In Paris there are two forms of disease which go by names given to them from their being caused in this way. The men were subject (before these cesspools were ventilated) to a form of asphyxia called *le plomb des vidangeurs*, and caused by the sulphuretted hydrogen, and also to inflammation of the eyes called *la mitte des vidangeurs*, and caused by the ammonia in the foul air. In order to do away with these disadvantages various contrivances have been invented, and the best thing known is the air-tight tub or carriage which is exhausted, and then connected by means of hose with the cesspool. A tap is turned on, and the contents of the cesspool rise through the hose into the cart. This is supposed to be done without any nuisance at all, but any one who has walked about the streets of Paris and Lyons at night will know perfectly well whether there is any odour or not connected with the process. During the last few years a great variety of improvements have been made.



An experiment has been recently tried at Kew with what is known as the *Système Tallard*. A large barrel or cart was exhausted of air by a stationary engine, connected with the cesspool by means of a tube jointed in a most ingenious manner, and the emptying was carried out without the smallest nuisance. It is clear that the cesspool system has not yet seen its last days, and so it is important to recognise any plan which reduces the nuisance of it. As to the system of collecting the refuse matters in pails or tubs underneath the seat of the closet, which has been adopted of late years in many of our large towns, such as Birmingham and Rochdale, it is the only system, with very few exceptions, that has ever been made to pay. If it is necessary to have a collection in towns at all, as appears to be the case at present in some of our large towns, I think that this collection should be made in small quantities, so that the excreta are removed as fast as possible. I think that there can be no question that the towns at the present moment have chosen the pail system, and that they have done rightly; because, if these things are to be collected about the house, they had better be kept in such a condition that they cannot be kept in excessive quantity. A quick removal is ensured by this method, more than by any other conservancy method. It is the only method which has ever been made to pay, and it has been made to pay in various parts of the world. It has been adopted in China for some thousands of years, and it is no doubt due to the utilisation of the crude sewage from this method that China is at this moment not a barren waste, but conspicuous for its cultivation of the tea plant. It is the system that has been adopted for a great many years along the Riviera, for the cultivation of roses and orange trees; and has also been successfully adopted in various large towns in Germany.

In the modification of this method which is known as Liernur's Process, which is in use in Amsterdam and Leyden, the contents of the closets are carried by air pressure into underground receptacles, and afterwards removed in air-tight carts; but it is not proposed, as a rule, to utilise it as it is, but to dry it, and convert it into a powder. This process of drying does not pay, and never will pay. The manure does not pay the cost of being treated in this way. It will pay the cost of carriage to a short distance for utilisation as it is, but it does not pay for conversion. *Poudrette* is a dangerous substance to keep; this is a fact which is not generally known. An instance is recorded by Parent Duchatelet of some *poudrette* being placed on board ship and becoming damp, when the majority of the people on board were attacked with fever showing symptoms which leave little doubt that it was severe typhoid fever.

The mixed methods commence with the middens and ash-pits, which are being removed in almost every part of the country where they are found. These had been improved in the same way. The two great improvements in the midden system are making the receptacle water-tight and smaller, until what was formerly known as the Hull system consisted merely of a small space between the seat of the closet and the ground, a space made water-tight by being rendered with cement; the ashes of the house were thrown in, and a hard mass was thus made, which was dug out from time to time. With regard to the midden system, it is true with this as with the other conservancy systems; cartage is expensive, and so it is an advantage to the local authorities to keep the refuse matters about the premises as long as possible, especially if they are dried. We know how difficult it is in London to get our dust removed, and we know what a nuisance our dust produces. There is no possible advantage in collecting the manure in this way; in the majority of cases the middens have to be drained, because the ashes are not sufficient to dry all that is in the middens. The liquid part is then allowed to go off; the liquid is worth 7s. 3d. and the solids only 1s. 3d., and if the midden or cesspool be drained the most valuable part is allowed to drain away, and the part left is not worth keeping. This, mixed with ashes and soil, has never been found worth the cost of carriage, any more than the refuse of the dust-bin is worth carrying. Testimony was given by Sir Joseph Heron that in no case was it found to pay; so far was it from paying as a manure, that at Manchester, and several other large towns, they have adopted a system of burning it, and that is about the best thing they can do with it. The Fryer Process is one which, I think, has a future before it, and is likely to be considerably adopted, and some of the London vestries have been considering whether it may not be adopted for the disposal of the contents of dust-bins.

The dry earth system, which is a very old way of treating excretal matters, was improved upon and re-introduced by the Rev. Henry Moule; but experience has shown that there are considerable disadvantages connected with this system; so many disadvantages, that no large towns have been found to adopt it as a permanent system. The disadvantages of this system are that a large amount of earth has to be sifted and carried to the required spot, and again the mixture has to be carried away, so there is a considerable amount of carriage. It is necessary that this compost should be kept dry, and that is a very difficult matter. Slops must not be thrown in; the supply of earth must not fail. It was found in some parts of India that this system would not work at all, on account of the dampness of

the air. Moreover, we do not know that the mixture with earth disinfects as well as deodorizes. The earth system, which was largely introduced into barracks in India, was described in early reports as being a great improvement on the previous systems. A short time after, however, the reports became very doubtful. When one looked back to see what the previous systems had been, one could not be surprised that the earth system was superior to the ones previously in vogue. In India they came to the conclusion, as in every civilised community, that for every 191 lbs of refuse matter that had to be carried away there was only one pound that was removed by the earth-closet, and the remaining 190lbs. had to be removed by some other way, and therefore they came to the conclusion that it was impracticable. It can only be regarded as practicable for volunteer reviews, cattle shows, and other similar large temporary collections of people. It cannot be regarded as a satisfactory solution of the sewage question, except in small villages, where the closets are outside of the houses. I think it is quite conclusively shown that it is not suited for large institutions. As to the manurial value of the compost collected in the earth-closet: at first sight it would seem that all the manurial value of the excreta would be retained. This was apparently so clear, that in one of the Government Blue Books there was an elaborate calculation gone into, by means of which it was shown how large an income a town of 10,000 inhabitants would derive from the sale of the manure. This was made on the assumption that all the manurial constituents of the excretal matters were retained in the earth-compost. In the seventh report of the Sewage Committee of the British Association, it was shown clearly that the percentage of nitrogen in the soil used in earth-closets was increased only to a very slight extent by each use of the closet; and after the earth had been used six times in closets it was only fit to be used as a good garden mould, and would not bear the cost of carriage, except to a very short distance, so the whole question of the manurial value of the mould was solved in a very sudden manner.

With regard to conservancy systems, they are condemned by their name. The very fact that carriage is expensive makes the local authority remove the excretal matters as seldom as possible; and sooner or later all these systems become a nuisance, and they are only to be tolerated where no other system can be carried out. I am speaking now more especially of large towns. In small villages the dry earth system is often adopted with advantage when the earth can be readily got, and when the system is carried out under proper supervision.

In the water-carriage system very little is to be gained by



keeping any of the excretal matters out of the sewers. The sewage has to be treated all the same. The sewage of towns which adopt other systems than the water-closet system, has been observed to be fouler, because staler, than in towns, where all the excretal matters are carried away by water almost as soon as they are formed. I will merely say, with regard to the construction of sewers, that we have all come to the conclusion that sewers should be made water-tight, as small as possible (they are often too large) that they may be properly flushed, and they should be thoroughly well ventilated. I would remark upon this point the mischief of mixing water, which ought to go into drains, with the sewage. Surface water, which ought to go straight into the rivers, is allowed to mix with the sewage, and so renders more difficult the treatment of sewage at the outfall.

One of the greatest improvements we have arrived at in the present day in this matter is the way in which we deal with house sanitation. The fact that we have come to recognise that the drains of the house should be thoroughly and entirely disconnected from the sewer, and have an air break between them and the sewer, so that no sewer air can get into the house drains, is one of the most important improvements which has been introduced.

We come now to the treatment of sewage. There must in all towns be sewage to be treated: what I say now will apply to all towns. The sewage I am speaking of now is the liquid that runs through the sewers. We come to the point of the value of it. It is valuable, of course, because it contains a quantity of excretal matter, vegetable refuse, &c. Its value consists chiefly in the salts of ammonia (amounting to five or six grains in a gallon) and the organic matter. Each 100 tons of average sewage is estimated to contain dissolved matters worth about 15s., and suspended matters worth about 2s., so you will see that the suspended matters are worth very much less than the dissolved. The total is about 17s. per 100 tons, or about 2d. a ton; but it is worth to a farmer not more than 1d. a ton at the outside. With regard to the disposal of this sewage, it is very frequently turned into the rivers, to the pollution of the water, and the production of nuisances in various ways, not to mention the waste of the manure. It is also in many instances thrown into the sea, and when turning it into the sea does not cause a nuisance it may often be defended on the score of economy.

A variety of chemical substances have been used in the attempt to precipitate the valuable matters of sewage. When you consider that the most important manurial constituent is ammonia or salts of ammonia, you will see the utter futility of



using precipitating substances. To any chemist it is a self-evident absurdity. I have not time to describe to you the various precipitation processes, but must content myself with saying, that one and all have failed to precipitate four or five grains of ammonia from a gallon of sewage, and that the manures produced have been almost worthless. Some of these processes will be found to be of use, because they do precipitate the suspended matters from the sewage, and render the liquid more amenable to subsequent treatment; but the precipitates produced can never be valuable. Farmers have refused to take some of these precipitates when offered them for nothing, and in this have shown sound discrimination, rather than ignorance. One of these precipitation processes I propose mentioning, because it is a process which does not attempt utilising the precipitated matters as manure, and that is the process devised by Major-General Scott, in which the precipitate is burnt to form cement.

Intermittent downward filtration was suggested first by Dr. Frankland, who showed that sewage, when it is passed downwards and intermittently through soil, is purified, while if passed upwards, scarcely any purification takes place. It has been shown that large quantities of sewage can be purified on a small area; this plan was first carried out by Mr. Bailey Denton, at Merthyr-Tydfil, where the sewage of about 3000 persons was purified per acre of land, and has since been adopted at various other places.

On the question of wide irrigation, the first thing that should be stated, and which is not generally appreciated, is, that an irrigation farm should be an extended filter. The soils through which water will not go, are not capable of purifying sewage at all times of the year. It should be a soil which is pervious to water, through which the sewage can percolate into drains underneath. Purification, which is the first object to be attended to, goes on under all circumstances in pervious soils, so long as too much sewage is not put upon the soil.

In the winter the sewage is only partially purified upon impervious soils, so that one of the most important things in connection with it is that the soil should be pervious, and the sewage pass through it, and not merely over it. If sewage be taken and passed over a field which is impervious, it undergoes a certain amount of purification. If it be passed over a second field it may come off more impure than when put on it, and that was clearly shown in connection with some sewage at Redhill Farm. The Sewage Committee of the British Association made a number of experiments to determine what proportion of the manurial value of the sewage was utilised upon a farm. The farm which was experimented upon was Breton's Farm,

Romford. Samples were taken daily for several years, and subjected to analysis. The results were found to be that during five years the percentage of nitrogen recovered from the manurial constituents had been from 26 to 42 per cent., and averaged nearly 33 per cent., that is to say, one-third of the nitrogen which came from the town was recovered in the crops; about the same proportion as is recovered from the best artificial manures.

A word or two about the supposed dangers of sewage farms. The dangers are a myth; there is not the smallest evidence to prove that these dangers exist. There is no evidence that diseases like cholera, enteric fever, or entozöic diseases, have been spread by these means. One of the great difficulties in connection with sewage farms is, that the sewage has to be utilised and put on the farms at all times of the year, whether it is wanted or not. That is one of the great bugbears. That must be got over by laying out a certain area for the purpose of filtration at all times, whether the sewage is wanted on the land or not. In Birmingham, the committee appointed by the Town Council to report on the various sewage processes, came to the conclusion that it was impracticable to get sufficient area of land to adopt wide irrigation, and recommended the adoption of the plan of making a large filter. Different towns may adopt one or other of the two systems—either have irrigation supplemented by a filter, or have a large filter to purify the sewage without reference to irrigation. The staple crop on irrigation farms is Italian rye grass, which absorbs an enormous quantity of sewage. I hold in my hand reports of the British Association Sewage Committee which show that wheat, barley, oats, turnips, mangolds, cauliflowers, strawberries, peas, &c., have been grown successfully on these farms.

In very few instances have sewage farms been made to pay. They have been made to pay at Edinburgh, and at one or two places where the situations have been favourable. In many places pumping is required, but pumping is not so costly as people make out. It is a very slight expense to a town when the sewage has not to be lifted to any great height. The farmers will come to see that it is to their advantage to take the sewage and put it upon their farms, and I have no doubt we shall see a great many more places, in which, if money is not actually made by the sewage being utilised, at any rate very little expense will be incurred by the towns. Indeed, I adhere to my opinion, formulated ten years ago, that sewage irrigation will be ultimately found to be remunerative in many instances, and that opinion is shared by the Committee appointed by the Local Government Board in 1876 to inquire into modes of treating

town sewage. This, I believe, is the best solution of the difficulty for the largest number of places. I do not mean to say it is suitable for each and every place. In towns where it is found to be practicable, I think the inhabitants must submit to be taxed to a small extent for the removal of a serious nuisance, and the lowering of the death-rate.

After the reading of the paper, the following discussion ensued. Dr. CARPENTER occupying the Chair.

Mr. SILLAR thought that the author, in treating of the "present state of the sewage question," when enumerating the various means for the disposal of sewage, ought not so entirely to have set aside the various processes of precipitation. Any schemes of ordinary filtration were in a great measure frustrated by the amount of paper pulp which was contained in ordinary sewage, which by degrees clogged the soil to which the sewage was applied; if the sewage was chemically treated this evil was removed.

With regard to putting sewage on land, he wished to call attention to the fact that simple mechanical filtration was powerless to remove dissolved impurities, and that consequently their removal by passing over or through *land* must be due to the chemical action of the earth only; and that this chemical action could be more economically effected by bringing earth to the sewage than by conveying the sewage to the earth, for one cubic yard of finely divided clay presented a larger surface for this chemical action than many acres of land.

The depopulation of large ancient cities, alluded to by Prof. Corfield, was, he thought, due not so much to the contamination from sewage as to the fact of their populations eating up the produce of the country all around them, without any restoration to the soil of the manurial wealth necessary for its replenishment, but recklessly allowed to waste. The question is not a sanitary one only, it is essentially an agricultural one, and, as such, an important economical one, for we may depend upon it we too shall suffer from famine and pestilence if we continue to waste our sewage by throwing it into the rivers.

The author had raised an objection to manure produced by the chemical treatment of sewage on account of the evils which might arise from the dust of the Poudrette; but he (Mr. Sillar) considered that the dust from a sewage-farm in a dry season was open to precisely the same objection, and was more likely to spread disease, because a prepared manure is put *under* the earth, and not necessarily on its surface, and the process of preparation destroys the germs of disease. One great difficulty in the way of sewage irrigation was the difficulty of getting ground enough to treat the sewage from large towns by wide irrigation.

He maintained that experience had proved that a valuation founded on the chemical analysis of native guano, the produce of sewage, did not accurately represent its value or power for agricultural purposes.



Mr. DOUGLAS ONSLOW thought that in Prof. Corfield's address the money question had not been sufficiently dealt with, and he thought that this was a very important point in considering any scheme for the disposal of sewage.

There were many cases in this country where the system of wide irrigation suggested by the author was almost impossible; in the first place, land, and especially the right sort of land for the purpose, was not always obtainable; then there was the cost of the land, and the expense of pumping, &c., where pumping was necessary. In these cases precipitation was the only means that could be successfully and economically adopted, for even if the place was near the sea, it was a disgraceful waste to put your sewage into it, and was, in most cases, a great error. Precipitation had been successfully carried out at Coventry, during the last seven years, with very satisfactory and economical results, and the effluent water during dry weather made about half the stream into which it was discharged. The cost of the process, as carried out there, was 1s. per head of the population, and if the sewage of the town were disposed of by broad irrigation it had been carefully estimated it would cost not less than 3s. per head.

The money question was a very serious one, and in the interests of the ratepayers, by whom the burthen had to be borne, it should be given more careful consideration. He did not mean to say that precipitation gave better sanitary results than irrigation on land, but seven years experience proved incontestably, upon the highest authority, that where chemical treatment could be supplemented by filtration of the effluent from the tanks through a small area of land, excellent results could always be relied upon; and such a process would be often perfectly practicable at a comparatively small cost, whereas broad irrigation would be either absolutely unattainable or else so costly as to become a ruinous charge upon the community to be served.

Mr. R. W. PEREGRINE BIRCH thought that the pneumatic plan of emptying cesspools or receivers mentioned by the author would be rather too expensive for ordinary use, or to be employed on a large scale, as it would undoubtedly cost more than 2d. per ton to remove the material by pneumatic means and cartage; and this was an outside value for ordinary sewage.

To treat sewage profitably it must be done cheaply and roughly, and so, where rough treatment was undesirable it could not be made to pay.

He thought that the irrigation system had been adopted in Paris.

With regard to the suggestion of burning the refuse, the Corporation of London had a furnace for burning refuse that it was desirable to dispose of quickly.

He thought that no line could be drawn between a sewage farm and an intermittent filtration bed. The amount of land required, however, had, he thought, been rather under-estimated, and he doubted if the sewage of 3000 people had ever been practically and permanently disposed of upon one acre of land.



He considered that Mr. Sillar was scarcely justified in complaining of the *waste* of sewage, or in taking credit to his Company for the *portability* of the manure they produced, before he had on the one hand shown that this material was worth carrying, or on the other hand that the sewage was worth using. It was said that at Aylesbury native guano was sold for £3 10s. a ton, or rather that two tons which it was admitted contained about one ton of added material, worth about 2s., was worth £7, so that the ton of sewage sludge by being attached to a ton of rubbish, was made worth considerably above £6. This was very different to Col. Jones's experience. He was thought to have done well in realising £1 a ton for sludge, and he obtained this by mixing the sludge with a *higher* class manure, not stuff worth 2s. a ton.

Mr. G. B. JERRAM, A.M.I.C.E., said that he was using sludge in his experiments in growing peas and other vegetables on bad soil, or brick earth; and some of the farmers, who had given up using it on their farms when they had ceased to be paid for removing it, had come back and asked to be allowed to use it again.

He thought that the first necessity in the sewage question was to get rid of a nuisance as cheaply as possible, and if you could make the process pay so much the better. If sludge was treated on land, it ought to be deposited and dug in as quickly as possible; and he thought it would always be possible to find plots of waste land—such as Chatmoss, near Manchester, &c.—suitable for the purpose of sewage disposal in the vicinity of large towns.

Mr. THOMAS WILSON GRINDLE said that he had had considerable practical experience with various processes for the disposal of sewage. He had first tried the lime process, and with lime and chloride of lime he had obtained a good effluent; with the phosphate process he had also got a good effluent; and with the A.B.C. process he had seen a good effluent. The same with the process of the Rivers Purification Association, as now in operation at Hertford and Coventry; and he thought that it would be a good plan to have a meeting to settle whether some process combining the good qualities of these systems could not be adopted, which is impossible at present, owing to the ill feeling among the advocates of the different systems, and to the opposition of the Local Government Board to any other means of dealing with sewage than by passing it through land, which could not in all cases be obtained.

The Chairman (Dr. CARPENTER) commenced his remarks by stating that a congress held at Leamington sixteen years ago to consider this subject had, after the reading of papers—one of which was by himself—agreed unanimously that the treatment of sewage by irrigation was the best process to prevent the pollution of the rivers and streams of Great Britain. He then gave some particulars relating to the sewage-farm at Croydon (which was of an extent of 540 acres), and said that the vegetables, the cattle, and the milk from the cows fed on the

farm, were nearly all consumed in the town of Croydon without any ill effect ; and he said there was no evidence that irrigated farms were in the least unhealthy. In other respects, he thought that the disposal of sewage by precipitation might be advantageous in some places, where land was not obtainable ; but in all cases where the sewage was applied to land it should pass through a few *inches* of the soil of the land, and not merely flow over it. With regard to the produce of a sewage-farm, he said that if 5000 tons of ordinary town sewage were applied to the land he should expect to take off 40 tons of produce, and if that quantity was obtained nuisance would be impossible. He thought it would be a good plan in the arrangement of a sewage-farm, in some districts in which land was difficult of access, and in all places which consisted of a clay subsoil, to make part of the land into a kind of ballast-bed for the filtration of the sewage during mid-winter, when the same quantity could not be applied to the farm in the ordinary way as during the other parts of the year, the vegetation being at that time all but in abeyance.

There was a difficulty in placing the management of sewage-farms in the hands of local authorities, as they did not understand the practical working, and therefore could not make them pay. Until this (which was the present plan) was altered, they could not be expected to be financial successes.

The question of famine, referred to by Mr. Sillar, was no imaginary evil, but one that statesmen would soon have to face seriously ; and there was no step which could be taken of a more practical character than the establishment of sewage-farms near to every large town in the kingdom, for it had been clearly shown that each acre of land under sewage irrigation raised four times the amount of produce which could be obtained by ordinary farming.

PROF. CORFIELD, in reply to the discussion, said that the intention of his paper was to put before the Institute the main facts that had been arrived at in the various methods adopted for the disposal of sewage, and that he had not attempted to deal with any of these schemes in detail.

It is of no use to tell chemists that you can precipitate the ammonia in sewage with any commercial success, or that any plan of "fortifying" sewage sludge can be made to pay.

Sewage sludge is not in itself valuable, and no mixture of other materials with it will make it so. Of course, if you add valuable matter to it you may make it worth carrying, but it is like adding gold dust to sand, and then sending it somewhere else for the gold to be separated again, and no one would contend that this was a rational proceeding, or likely to be a financial success.

The market value of one ton of sewage manure varies from about 1s. 6d. to 10s. 6d. With regard to Mr. Sillar's remark that chemical analysis would not show the value of sewage, he would say that it was quite possible to ascertain by analysis the parts of any sewage manure that would be useful in growing crops. He was of opinion that the value of all sludge had been over-estimated.

One advantage in sewage irrigation is the enormous increase in the value of land treated in this way.

In reply to Mr. Birch he would say that sewage, in the proportion of 3000 people to one acre of land, had been practically tried at Merthyr-Tydfil for a number of years.

With regard to Mr. Grindle's statement that he had produced "good effluents" with various precipitation processes, including the lime process, it must be observed that different people evidently had very different ideas as to what constituted a good effluent, for the Rivers Pollution Commissioners, after mentioning various places at which the lime process was used, say: "In all these places the plan has been a conspicuous failure, whether as regards the manufacture of valuable manure or the purification of the offensive liquid."

Mr. ROGERS FIELD, M.I.C.E., in moving a vote of thanks to Prof. Corfield for his valuable address, said that some of the speakers had complained of certain points being omitted, but the fact was that the subject was so enormous that it was a wonder how Prof. Corfield had managed to condense into his address the amount of matter to which they had listened, and he was sure that they would all agree with him that a most cordial vote of thanks was due to Prof. Corfield for the able manner in which he had brought the subject before them.

The vote of thanks was seconded by Mr. G. J. SYMONS, F.R.S., and carried unanimously. The proceedings then terminated.

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# INAUGURAL ADDRESS,

SESSION 1881—82,

BY ALFRED CARPENTER, M.D.,

VICE-CHAIRMAN OF THE COUNCIL.

*Delivered December 7th, 1881.*

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GENTLEMEN OF THE SANITARY INSTITUTE,

It is my duty, in the absence of your Chairman, to preside on this occasion. I am a poor substitute for so accomplished a Hygeist as Professor de Chaumont, but I will do my best to occupy his place. I congratulate you most heartily upon the position which the Sanitary Institute of Great Britain occupies at this present time, notwithstanding the impediments which have been placed in the way of its progress by bodies who imagine themselves to be its rivals, as well as by the difficulties which have had to be encountered in founding a corporation upon so diversified a basis as that which we have taken as our area. I may instance the successes which have attended the congresses held first at Leamington, then at Stafford, then at Croydon, and last year at Exeter. These have given a solidarity to our body, and have placed its objects so forcibly before the public, that it might seem superfluous to urge the points which I propose this evening to submit to your notice. It has been said, and I think with justice, that a corporation like ours which is without pecuniary endowments, and without substantial income from some regular source, can scarcely expect to become an institution which shall be on a firm basis, and capable of influencing public opinion, unless its claims to support are such as are undoubted, and its members much larger in numbers than are at present our own. I wish this evening to point out, not so much for your information as for that of the public at large, the claims for recognition which the Sanitary Institute has upon the general public, and its right to be regarded as one of the necessary institutions of the country.

The volumes of transactions which have been published are standing witnesses of the work which the Institute has already performed. The list of Surveyors and Inspectors of Nuisances



who have obtained the certificate of the Institute, points to the fact that it is in actual operation, whilst the ignorance which has been evinced by some of the rejected candidates for those diplomas, and who already hold office under local boards and town councils, points out in a most decided manner the necessity for better education upon the points which are put forth in the syllabus of the Institute as those necessary for their members to be acquainted with.

Before proceeding to discuss the claims which the Institute has for public support, and the foundations upon which it ought to base its application for a Charter of Incorporation, I may be allowed to refer to the obstacles which have already appeared in its path, and which have postponed the consummation of this object. There has been opposition from members of established bodies who appear to think that the Sanitary Institute is likely to encroach upon the functions of the older bodies and to usurp their privileges. I wish to point out the error of this course of procedure, and to insist upon the fact that there is no antagonism between the bodies in question and our own. I can of course deal only with objections which have been made by individuals to myself, and with which I am personally acquainted.

It has been said that the Sanitary Institute is antagonistic to the *Social Science Association*, and some men have declined to help the one because they belong to the other, and see no object in the establishment of both. I contend that the Sanitary Institute is the legal offspring of the Social Science Association; the natural result of the teachings of social science, and that so far from being antagonistic they stand in the relationship of father and son, and as such ought to have a natural affection for each other. The Sanitary Institute by its certificate proposes to remove one of the many evils which have been so resolutely exposed at Adam Street, Adelphi, viz., the fact that there was no means of knowing the duties of sanitary inspectorship except by learning them after appointment to office; and that sanitary authorities could not tell whether those applying were qualified for the office they proposed to fill. That in electing men as surveyors and inspectors they elected those who had most influence with the electors from personal consideration rather than from any knowledge of the work they were undertaking to perform. The result has been, as is well known to the Social Science Association, that nineteen-twentieths of the inspectors appointed to do sanitary work have no really skilled knowledge of the work they are called upon to perform, because until the Institute was founded there was no guide upon such matters to whom the public could go for undoubted information, and for a stamp of fitness to do the work. The Sanitary Insti-

tute does not encroach upon the Social Science Association in any way, except so far that it organises a sanitary exhibition in the town which it visits, and makes that a financial success which in the hands of the Social Science Association has generally been held at a loss either to the Association or to the local Committee. The Sanitary Institute, however, sees no reason why the Social Science Association, as well as other kindred bodies, should not continue their exhibitions at their places of meeting, if they think fit, as likely to spread better notions upon Sanitary work among the general public, which it is the aim of both bodies to effect, and I have no doubt but that each will assist the other. For until the general public have far better notions upon the scope of that work than they have at present, it will be a long time before the benefits to be derived from such exhibitions will be slight, and the necessity for the performance of that function of the association will cease to exist.

I am told that some of the members of the Royal Institute of British Architects are opposed to this Institute obtaining a charter; and that a similar antagonism exists among some of the Surveyors and the Engineers. If we were proposing in any way to educate and examine men so as to fit them for the profession of an architect, of a surveyor, or of an engineer, there would be a reason for this antagonism; but it would be quite out of our province to propose anything of the kind, or in any way to come into antagonism with those bodies in their professional work. It is true that an architect ought to know the principles of public health, so far as they are connected with house-building, and that an engineer should be acquainted with the principles of sanitary science, so far as they are associated with sewage and water supply, and that surveyors could not be fitted for their duties if they did not know how to advise a highway board or a sanitary authority upon the right way to prevent nuisance. But these very points are those which the bodies in question have no means of knowing except from outside help, and especially that help which is forthcoming from members of the medical profession and professed hygeists. It would be far better for each of those bodies to do as the medical corporations are now doing with regard to general education—be content with a certificate from a recognised teaching authority—rather than to examine for themselves into matters which are outside their own immediate work: and it must be acknowledged that vital statistics and the laws of health are no part of the work belonging to either architects, engineers, or surveyors, as such, any more than the teaching of mathematics, or of Greek, or of Botany, are to the medical man. Foundations they may be upon which the science of medicine may rest, but no more necessarily belonging

to it than is the analysis of the water of an underground stream to the work of an engineer.

There is a still more important reason why the Institute should be recognised, and even supported, by the bodies I have just mentioned. Neither of those bodies would trouble themselves to provide an education, and a test of its appropriation, to the large class of men who are now necessary parts of our great sanitary army, viz., the local surveyors in small districts, and the sanitary inspectors of the whole of the kingdom. It is upon the knowledge possessed by these men that architects and engineers have very often to rest. The information obtained from these men is sometimes the basis upon which the professions I have mentioned have to act in deciding upon their own work. The depth of the foundations of a house, or the direction in which a sewer shall be laid, is very often determined by information obtained from men who are totally ignorant of the first principles which ought to guide the members of established institutes of the country in their own immediate work. I think our Institute ought therefore to look to the older corporations for assistance in its labours : for help, not for antagonism, in smoothing away its difficulties. It is to some of them that we should, and do, naturally look for assistance in our work, for some of their members guide our destinies, and take part in promoting our work in connection with the medical element in the council, work which cannot be brought into their own institutes or act in any way as part of their corporations. It would be quite as reasonable for the medical corporations and the British Medical Association to oppose our design from fear that we proposed to provide medical officers of health and medical attendants upon the poor, as for architects or engineers to think that we should in any way encroach upon their domains.

The importance of the duties which surveyors and inspectors of nuisances have to perform is more patent to medical men than to any other distinct class of persons. The ignorance which exists among these officials is marvellous, and yet these men very often guide the health committees of our vestries, our town councils, and our local boards, upon points which are intimately connected with the health of the people, and they are used very often for counteracting the activity of the medical officer of health. No wonder that small progress is made in our work : no wonder that the action of sanitary authorities is unsatisfactory, when the minor details upon which the principal success of the whole is often dependent are carried out in a way which enables the sanitary authority to show to the expert the best way of "*how not to do it.*"

Having dealt with the main object of the Institute, perhaps I



may now be allowed to glance at a few of the subjects which are at this moment most interesting to us as students in the Science of Health, and which come properly before us as part of our work. I will refer first to the existence of fever.

Typhus is amongst us, not to any extent, but there are, or have recently been odd, and only odd cases, in all the principal divisions of the metropolis. The appearance of these odd cases is suggestive of that which the Lisson Grove outbreak has shown us to be possible, if circumstances should arise which should compel people to keep themselves warm by aggregation. Let us understand that the germs or factors of typhus are among us, and it only wants cold, bad food, and close quarters to repeat an outbreak similar to that at Lisson Grove in every crowded part of London. There is, unfortunately, a conflict of sanitary authority still among us. The police have the care of lodging houses, and have to put sanitary laws in force; they have nothing to do with houses full of people, if the place is not registered as a lodging house; whilst the sanitary authority has no right of entry at night, when the over-crowding is in actual operation. In the majority of instances it is to the interest of the occupants of these over-crowded dwellings not to disclose the fact of the over-crowding which does take place, and as a consequence the germs of typhus and relapsing fever are sometimes spread broadcast before the existence of the disease in a given house is even suspected. The sanitary care of lodging houses, in regard to over-crowding, should be with the sanitary authority, with the assistance of the police, and should not be taken out of their hands by the latter, whilst there should be a power to enter in the night any house let out in tenements, whenever there is reason to suspect that there are too many occupants in any of the rooms thus let out as distinct apartments. Again, it is not right that there should be any conflict between the sanitary authority and the destitution authority. The care of the sick should be placed entirely in the hands of the sanitary authority, whilst the destitution authority should look after the able-bodied, the aged, and the infirm, and provide the funds for the expenses which may be incurred in looking after the sick paupers. By this means sickness alone would not be, and should not be, in any way connected with the pauperism of a given individual, as cause and effect.

Leaving typhus, let us look at typhoid, or gastric, or enteric fever. Every autumn for some years past this disease has appeared in our midst, and the mortality rises or falls in numbers in close attendance upon the rise and fall of the temperature of the water, and of the soil. Like to typhus the germs are every



where,—they only require to come from a case of the disease as excreta, and to find their way into the water-supply of a given district, when that water is a little warmer than usual, and when oxidation is rapidly appropriating the oxygen naturally contained in that water, to produce an epidemic in any or almost every part of London. As far as London is concerned, if its water supply continues to be taken as heretofore, from streams polluted with crude sewage, the epidemic, some day, will, in my opinion, come with fearful intensity when the temperature of the Thames water is raised a few degrees more than it has been during the past summer. Cases will then be very numerous in all parts of London, except that supplied by the Kent Water Works, and the sewers will become loaded with excreta in sufficient quantity to infect the whole mass of sewage, and enable the gases of decomposition which now arise from badly constructed sewers to carry the factors of mischief in every direction infecting water and milk, and several other articles of food which may be exposed to their influence. The sewers being warmed by the hotter season will give out in autumn and in a mild winter sufficient morbid matter to generally continue sporadic cases, even after the temperature of the Thames water has been reduced to its ordinary standard. For as the sewers of London are now constructed it is very possible in any given place into which typhoid excreta are thrown—such excreta not having been previously disinfected—for them to come into contact with some warm sewage, the warmth having been obtained from the waste-pipe of some steam-engine, or from some hot refuse from a manufactory, the germs of the disease would then multiply to a very considerable extent, and be distributed throughout the district which that sewer provides for. The real remedy for this state of things, is the ruthless exclusion of excreta from every part of the course of the Thames, and every other stream above the intake of water companies, unless that sewage has been previously most thoroughly utilised by irrigation; that principle alone has the power to abstract the factors of disease from the water in which they may be suspended, and in which, unless they be utilised in a proper manner, or destroyed by chemical action, they are certain to increase and multiply in a most rapid manner. Exclude all crude sewage from the Thames, and insist upon the sewers of London being self-cleansing, and not as they are now—simply sewers of deposit, and, in my opinion, typhoid would disappear as an epidemic, and be seldom present amongst us even in its sporadic form.

The subject of summer diarrhœa is intimately associated with that of typhoid. The cause which will produce the one will not fail, under some other conditions, to give rise to the other.

The prime factor is the same in each case, distributed, it is true, in a somewhat different manner, but both requiring the steady opposition of the local sanitary authority to a continued soaking of subsoil with unutilised excreta, and an intelligent supervision of their work by skilled inspectors.

There is a point in this part of the case which would be worthy of enquiry and continued observation by members of the Institute, and which requires a series of observations in numerous places at the same moment to be worth anything, viz.: the variation of the temperature of the soil and its relationship to the quantity of carbonic acid in the ground air, the ground water, and in the atmosphere proper. I believe that there is an intimate relationship between summer diarrhœa; temperature, and moisture, and the presence of an excess of carbonic acid in the subsoil, or in the water. It is in such conditions that the factor, capable of producing typhoid and summer diarrhœa, can assert its individuality.

I may, perhaps, be permitted also to make a few observations upon the subject of small-pox. The Government has, as you are aware, appointed a Commission to inquire into the subject of hospital accommodation for infectious diseases in the Metropolis, consequent upon the dead-lock which has followed the legal decision given in the Hampstead Hospital and Fulham Hospital cases. As I have the privilege of being a member of this Commission you will not expect me to make any revelations as to our plans or our designs.

I can say that the district in which I reside is adequately provided with hospital accommodation for infectious diseases, but, unfortunately, that hospital is in the hands of the destitution, and not in those of the sanitary authority. I have endeavoured to procure a transference of the buildings from the one body to the other, but such is the greed for power on the part of the Local Guardians, that they refuse to part with their hospitals to the Local Board of Health, by which means the hospitals might be made much more useful for the purposes for which they have been erected than they are at present. It has been shown that 80 per cent. of the patients admitted into the Metropolitan Asylums' Hospitals were not paupers. It follows that hospitals in the hands of sanitary authorities proper, will be four times more useful than they are now in our case, in which their operation is mainly limited to the pauperism of the district, and as a consequence they are scarcely used at all, at least in the general way in which they would be if they were not in the hands of the Guardians of the poor. I think it may be taken as an established fact that the pauper class (excluding the casuals) are much better

protected against the effects of small-pox than the class immediately above them, and who are more under the influence of those fanatics, who object to vaccination, and who provide the funds by means of which that inane objection is kept alive. The subject of hospital accommodation for infectious diseases is one which should be considered by the Council of this Institute, and it would assist the Commission if some evidence was formulated, and, with the approval of the Council, tendered to the Commission as the united opinion of the Council of the Sanitary Institute. This, of course, would only apply to the great principles upon which, I conclude, they would be in a great measure in accord, and that no disputed point would be tendered unless carried by a very large majority.

There is another subject which ought to engage the attention of the Institute as it is intimately associated with the health and the well-being of the people. I mean the water supply of great towns. There are arguments in favour of companies, as well as against them, and they are debateable points, but there surely is no valid argument against the necessity for a constant supply; for an abundance of water of a pure character at the corners of our main streets, and for a removal of those anomalous conditions which allow of whole districts being deprived of a necessary of life at the will of a commercial company, without the power of recovery of any of the damage which must necessarily arise to those exposed to the mischief, although the water has been already paid for by the unfortunate inhabitants. Water companies ought, as well as railway companies, to be liable for neglect to perform their contract, and for illness which they may have caused by distributing an impure article. If a railway company issues a ticket, but fails to convey the passenger, the latter has his remedy at law; a customer of a water company is deprived of his supply for days together, and appears to be without remedy. If a passenger is injured by the fault of a railway company's servant, the passenger has his remedy: the same should be law as against a water company, and it appears to me to be a part of the work of the Sanitary Institute to urge that such provisions should become law, and that the loss caused to an individual by the distribution of typhoid disease should be recoverable from the body distributing it, whether a company or a corporation.

I must not pass over the subject of smoke prevention without observation, having myself been instrumental in forcibly directing the attention of the public to the damage which accrues from the present faulty plan of burning coal, and the mischief which results to organic life from its use as at present carried out. I may be allowed a word or two in support of the principle



contained in the use of gas in the place of coal. I believe that we are year by year taking away more and more of that sunshine which is naturally our portion, and that we are year by year diminishing in consequence the proper proceeds which ought to be derived from the fruits of the earth. A cloud formed of vapour obstructs, and it is natural to our atmosphere that it should obstruct, the light of the sun, but let that cloud be only slightly imbued with a ton or two of coal diffused through it in the form of an impalpable powder, and the obstruction to the passage of the light and heat of the sun becomes immense. It injures vegetation, it injures animal life, and it is a damage to the prosperity of our country. Electricity is coming to our rescue, and when gas companies find out that the necessity for high illuminating power no longer exists, that a gas which shall produce more heat and less light is the more advantageous, and that it must be produced at a low price, say 2s. 6d. or even 2s. per thousand feet, we may hope to see it come into general use for cookery, for ventilating and heating purposes, to the immense advantage of the health of our people and the restoration of some of that sunshine which cooks and manufacturers are at present diminishing very materially in amount.

Electricity will light our places of public assembly, and let us hope our houses also, without destroying the salubrity of our atmosphere indoors; and whilst deposing gas from its present position as our principal lighting agent, it will compel it to occupy the place which belongs to it, viz., the production of heat, and then the thousands of tons of coal which now float in the air of our country and coat our trees, our shrubs, our animals, and even our annual plants with a coating of black, will no longer be permitted to begrime our landscape and deprive us of that sunshine which is not more plentiful with us than is necessary. There will be a much greater scope for gas manufacture than that which exists under the present regime, and gas shareholders need not in any way be afraid that their dividends will not be forthcoming.

The work of the Institute, however, is to try and interpret the laws of nature without reference to financial considerations, and if a certain action tends to diminish the health of the community, though financially that action may be profitable, it is our duty to point out the injury which results from it, and it may be even to suggest a remedy.

There is no greater injury to the community at large than that arising from the want of knowledge, which is so perceptible in the minor officers of our great sanitary army. If the corporals and sergeants of a regiment do not know their duty, how



is it possible for the captains and colonels to do their work? confusion must arise and there must be defeat in action.

The Sanitary Institute proposes to remedy this defect by imbuing the sanitary authorities of the country with the belief that the best way to do a thing is *to know how*, and that the stamp which the certificate of the Institute affords is the best guarantee that any sanitary board can possibly have that the candidate for a given office of surveyor or sanitary inspector has the requisite knowledge; and it is upon this fact that we ground our hope for a long and beneficial page in the future history of the institutes of our country, and in course of time to obtain a Charter of Incorporation from the Government.

It has been already announced that the next congress of the Institute will be held at Newcastle-on-Tyne in the autumn of 1882. It is a great advantage to have time for preparation, and I trust that the members of the Institute will take care that the meeting be even more successful than any which has preceded it. The arrangements which the Council are making for the formation of a local branch of the Institute in the town which invites them will be the means whereby a lasting impression may be made upon the district, and something tangible left behind, which shall mark the visit, and make it remembered by the student in sanitary science whose enlightenment commenced with the visit of the Institute to his place of residence. At any rate, *Rest and be thankful* is not the motto of our association. Let us determine that *Excelsior* shall be emblazoned upon our flag, and that we will not rest until we have planted it upon the highest pinnacle of the fortress of health.

A cordial vote of thanks was passed to Dr. Carpenter for his address. The proceedings then terminated.

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# THE ADMINISTRATION AND HYGIENE OF BRITISH HOSPITALS.

BY HENRY C. BURDETT, F.S.S.

*Read Feb. 15th, 1882.*

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## ABSTRACT.

So much misapprehension prevails as to the origin of hospitals, that it seems desirable to show by actual evidence that they were known previous to the birth of Christ. The inhabitants of Arabia, Persia, and India, possessed hospitals, some of which were supported by their governments long before the Christian Era. The Buddhists cut on rocks their edicts on hospitals, one of which, dated B.C. 220, can be seen near Sourat to this day. Medicines were provided, and skilled physicians were appointed to these hospitals at the expense of the State. All the physicians attached to the court, male and female, were compelled to give their services gratuitously to each of the hospitals as they might be required. Hospitals were established amongst the fire worshippers of Persia from the earliest times, the people being compelled by law to maintain suitable houses for the suffering poor of their community, whilst the king provided the best medical treatment for the inmates, free of cost. It is declared, upon evidence not entirely unauthenticated, that the sick were treated so far back as 1124 B.C. in the temples of Æsculapius, at Titanus, a city of Peloponnesus. The Æsculapian temples had some features, at any rate, in common with our hospitals. Certain of these buildings were set aside for the exclusive treatment of patients suffering from infectious diseases. Tablets were suspended upon the walls, on which were recorded the history and treatment of each patient.

Finally, the Valetudinariums referred to by Seneca and others were in reality private pay hospitals or hydropathic establishments for the well-to-do. The first Christian hospital was founded at Bethlehem by St. Jerome in the year A.D. 300, and he it was who first used the word "Hospital" to describe an institution devoted exclusively to the reception and relief of the sick. St. Ephraim or St. Faviola is entitled to the credit of

founding infirmaries which were supported exclusively by voluntary contributions, and for the sole purpose of treating the sick.

The oldest hospital in Europe now in use is the Hôtel-Dieu, which was founded A.D. 600 by St. Laudry, Bishop of Paris ; and the first hospital opened in England was built at Canterbury by Archbishop Lanfranc. Mr. Burdett pointed out as a remarkable fact, that Guy's Hospital, which is one of a very few, if not the only English hospital founded on the monumental, as opposed to the Christian idea, has recently been the scene of serious controversy, which report declares to be due, at the bottom, to differences of opinion on religious matters.

This circumstance is noteworthy as showing that money left for a specific purpose by a benevolent founder may, in process of time, come under the absolute control of those whose views, and whose mode of administration, are probably very little in accord with the views and intentions of the originator himself.

Passing from the past to the present, Mr. Burdett showed that the number of beds available in the General, Special, and Convalescent Institutions throughout Great Britain approached 25,000, exclusive of Poor Law and Cottage Hospitals. The number of in-patients relieved every year at some 200 Institutions was nearly 190,000 ; the number of out-patients relieved at 250 General and Special Hospitals, and Provident and General Dispensaries, was nearly 2,000,000 annually. The average gross annual income from all sources received by British Hospitals, Convalescent Institutions, and Dispensaries amounts to £1,450,452, and the average gross annual expenditure to £1,447,601. These figures, which are based upon the average receipts, expenditure, and work during three years, prepared upon an identical basis, and checked by an accountant, went to prove that if the incomes of the different medical charities were fairly distributed according to the requirements of each centre of population, the funds available would be equal to the demand.

As a matter of fact, many of the leading London Hospitals are now very seriously embarrassed from want of funds. No less than three of the chief of them—St. George's, King's College, and Westminster—have, within the last few days, brought their impecuniosity prominently before the public in the columns of the *Times*. In a leading article which these appeals called forth, the *Times*, alluding to a deputation of two years ago to the Home Secretary, which urged upon him the necessity of appointing a Royal Commission to enquire into the whole subject, and to his reply "that public opinion was not yet ripe for such an enquiry," remarked : "It seems likely that the condition of ripeness, if not absolutely reached, is at least brought within a measurable distance of time." An

enquiry can do no possible harm. By its means alone can the exact facts be ascertained, and the sooner a Royal Commission is appointed the better it will be for the hospitals, the public, and the poor.

Mr. Burdett then proceeded to consider the best scheme upon which British Hospitals can be governed and managed. He pointed out the abuses attending the acceptance, without the fullest enquiry, of the offices of President or Vice-President of a Charity by a member of the Royal Family, a Bishop of the Church, a Peer of the Realm, or other representative personages. The name once given, the promoters were enabled to use it as a kind of peg upon which to hang any number of appeals for support, and any number of schemes for bleeding the charitable public. No name ought to be given to any Charity without the most careful, thorough and competent enquiry. Mr. Burdett further pointed out the evils attending the present system of selecting any apparently presentable person who might offer himself for the office of Superintendent or Secretary to a Hospital. There could be no doubt that to elect a half-pay officer, with a small pension, to such an office, because it enabled the Committee to pay something less than a fair rate of remuneration for the services of a gentleman in such a position, was to do great mischief to the Charity and great wrong to the individual. The labourer is worthy of his hire, and it would be a wise step for Hospital Committees to decide to pay such a rate of remuneration as would enable them to command the services of the most eligible candidates, especially as such a result could be obtained if the maximum salary of such an official were fixed at 5 per cent. upon the annual income of each Hospital. Mr. Burdett showed it would be possible to train men for these positions to the great advantage of the Institutions, and to the great economy of charitable funds.

He referred to the dangers of non-formula prescribing in out-patient rooms, by which system overworked Dispensers became the unwitting means of causing serious risks to the health and sometimes to the lives of those of Her Majesty's subjects who seek this kind of relief at the Hospitals. The ticket system was criticised unfavourably, while the free system was extolled, the advantages and disadvantages in each case being fully stated. Allusion was made to a proposal now in course of adoption, to establish a North Metropolitan Hospital for North London, with 300 beds, upon the most approved principles of Hospital administration known to those best competent to form an opinion on the subject. It was also declared to be desirable for enquiry to be made into the present system of managing British Hospitals, and for a Hospital Society to be



formed with the object of effecting a free interchange of views between Hospital Authorities.

On the question of hygiene Mr. Burdett showed, by quoting instances, that in the majority of cases the Hospital Committees have imperfect plans or none at all of the drainage of such Institutions, and are often in entire ignorance of many points relating thereto which ought to be as familiar to them as the letters of the alphabet. The relative mortality of large and small Hospitals, the right system of drainage, the advantages of isolated wards adjoining the operating theatre for the treatment of such cases, and the best system of managing infectious and convalescent hospitals with a due regard for the public health, were fully dealt with.

In conclusion, Mr. Burdett expressed his opinion, based as it was on actual experience, and many years' study of the subject, that Hospital Saturday had practically proved a failure everywhere. In London, Hospital Saturday more nearly resembled a fiasco than a failure, for, after several years' labour, begging for alms in the public streets, the institution of numerous benefit performances, and other means which the working men justly regarded as illegitimate, the sum subscribed by the whole of the working men in London *for upwards of 100 Hospitals and other Institutions* amounted to a less sum than the workmen in the Clyde have frequently subscribed for *one* of the Hospitals at Glasgow. The proposal to institute a Convalescent Institution, which should be founded and supported by the working classes in the metropolis, was worthy of commendation. He hoped that it would result in the abandonment of the Hospital Saturday movement, in favour of a working men's provident Convalescent Home. Such a result would relieve the London Hospitals from much anxiety, and would get rid of a movement which, in his opinion, did the Hospitals far more harm than good, and which had never proved, and was never likely to prove, a substantial financial success.

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After the reading of the paper the following discussion ensued, Professor F. S. B. F. DE CHAUMONT, M.D., F.R.S., occupying the Chair:—

Mr. E. C. ROBINS, F.S.A., said that the idea of concentration and amalgamation, as suggested by the Author, was open to several objections, for if Hospitals are to remain a charity as at present, a certain amount of freedom must be allowed to the supporters. Charity will not go in a regular line, and people do not like to be told how they are to do their charity, and how their contributions must be apportioned. With regard to plans of the hygienic arrangements, he said that in any building which he designed, he always supplied plans of the drains, and gas, and water services, to the Board, Committee, or whoever

might be in charge of the building at its completion, and he thought that the deposit of such plans by the architect ought to be insisted on by the medical officer with regard to every hospital; the plans ought to have every pipe about the building marked, with its direction, and instructions as to the purpose for which it was intended, as a guide to those who had the responsibility of keeping them in order, and also to prevent disarrangement in the case of alterations.

Dr. BRAXTON HICKS thought that a Conference on the question of Hospital Administration would be very useful, if the medical men connected with hospitals were well represented; as a general rule he thought that the medical men did not have enough to do with the sanitary arrangements and general management. In Guy's Hospital, with which he was connected, the Governors and the Medical Staff were never (before the last difficulties arose) brought together, except at the half-yearly dinner; now two members of the Staff met in the House Committee. One great fault of committees generally was, their fluctuating character. Sometimes only a few, often not the same as at the previous meeting, came to them. He wished that those who were so kind as to undertake the responsibilities of a Governor, would also be constant in attendance, difficulties would arise much less frequently in a full meeting.

The name of Matron was, he thought, of more importance than appeared at first sight. It was very important to attend to the domestic comforts of the ward; and one had only to ask the patients to find that when the head of each ward attended to their comforts the arrangements were much more satisfactory. He considered it a very great disadvantage to divide the work of the matron, as dual responsibility was always bad.

He agreed with the Author of the paper, that a great evil arose from the practice of passing nurses on year by year from one ward to another. Sometimes the proficient nurses were taken away to attend the pay wards, where they existed. Doctors did not get used to the nurses, nor the nurses get used to the ways of the doctors, it was not nearly so easy to perform an operation satisfactorily if you had to instruct the nurse in every particular, instead of keeping your mind clear for the work.

Mr. C. MACNAMARA, F.R.C.S., said, that the best thanks of the public were due to Mr. Burdett, not only for the valuable paper he had just read, but also for his untiring labours in the cause of hospital reform. He was of opinion, however, that Mr. Burdett was over sanguine in his ideas regarding the advantages to be derived from a conference of our hospital authorities, for the purposes of promoting co-operation among these institutions. The truth was, few people acquainted with the subject could reasonably hope that any such action would lead to a satisfactory result. In many cases the interests of the non-medical, the medical, and the school authorities were at variance, and still more so in the case of different hospitals, it was because of these conflicting interests that it had become necessary to invoke the aid of a Royal Commission to solve the difficulty.

For instance, the out-patient system of our hospitals was in a very unsatisfactory condition ; but if reforms were effected in this respect in one institution, a neighbouring hospital not following the same course was overburdened with patients, and by its rules might be prevented from turning any patients away from its doors. Again, there were strong arguments advanced in favour of making out-patients contribute to the expenses of the hospital ; but if one institution enforced payment the patients would entirely forsake it, and go to another hospital where no such charge was made. The system, or rather want of system, was most demoralizing to the poor, and of very doubtful advantage to them from a medical point of view. The same might be said especially with reference to the in-patients admitted into many of our special hospitals.

The relation between our hospitals and medical schools was a matter of very great public interest, and recent experience had demonstrated the fact, that these interests were not at present (in all cases) on a satisfactory footing, and nothing less than a Royal Commission could sift the evidence necessary to form a clear opinion on this matter.

No one had shewn more clearly than Mr. Burdett, how necessary it was that the public should be informed regarding the difference in expenditure that existed in our various hospitals, some of them were not spending enough, or others were evidently spending far too much under existing circumstances. It was impossible, however, to form a just idea on this important matter, unless our hospital accounts and returns were based on similar forms ; and considering the large sums of money subscribed for these charities, it was most important that accounts, dates, &c., should be available. This again was a work which the labours of a Royal Commission alone could bring to a satisfactory conclusion.

Lastly, large as the sums at the disposal of our hospitals were, many of them were sadly in want of means, in fact the time was probably not far distant when they would have to curtail their operations, unless more money came to hand. So high an authority as Lord Kimberley had lately referred to this subject, and thrown out hints as to the necessity that exists for giving support to our hospitals from the public purse. A Royal Commission could alone enter into this subject, so as to convince the ratepayers that the time had arrived for adopting some such course of action.

MR. H. C. BURDETT in reply said, that at discussions on hospitals people always agree as to what should be done, but it is not done.

He thought that Mr. Braxton Hicks had rather misunderstood his idea of a Hospital Committee, he strongly objected to a medical and lay Committee working separately, and urged that there should be one Committee in which both elements were well represented.

Until we had the evidence that would be brought out by a Royal Commission, we should not be able to say what was the best method of management.

A cordial vote of thanks was passed to Mr. Burdett for his paper. The proceedings then terminated.

# THE RANGE OF HEREDITARY TENDENCIES IN HEALTH AND DISEASE.\*

BY GEORGE GASKOIN,

SURGEON TO THE BRITISH HOSPITAL FOR DISEASES OF THE SKIN,

*Read March 8th, 1882.*

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## ABSTRACT.

AFTER acknowledgments paid to the munificence of the donor of the prize, and to the liberal spirit with which he allowed the subject to be treated, the author of the paper touched slightly on the limitation which had been placed on the subject of heredity, and allowed that he experienced some feeling of hesitation and discouragement, however, prepared by previous observation and experience, under the idea that the conclusion was already prejudged—he being well assured in his mind that to hereditary tendencies, either in health or disease, no boundary could be fixed, that is to say, that it could never be found. He allowed, however, that the subject gained somewhat in simplicity and in practical bearings through this curtailment. It also brought the subject more into the grasp of the writer, whose qualifications for the task came wholly from his course of study in the practice of his profession as specialist and clinical observer, and not by any means as scientist.

The subject of heredity, so extremely complex, and allied to some of the deepest problems of organised existence has been, at least of late years, more earnestly and exhaustively dealt with by devotees to natural science than by professors of the medical art, who, with some marked exceptions, have rather slighted it or neglected its cultivation. Quite recently one

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\* In the autumn of 1879 the Rev. E. Wyatt Edgell, then Treasurer of the Institute, offered to place in the hands of the Council a sum of £200, to be given by the Institute as a prize for an Essay on "The Range of Hereditary Tendencies in Health and Disease;" and, at a Meeting of the Council, held on December 18th, 1879, it was unanimously resolved that this munificent offer be accepted, with the grateful thanks of the Council. After the prize was awarded, on December 12th, 1881, the Council invited Mr. Gaskoin, the author of the Prize Essay, to read a Paper on the subject at one of the Ordinary Meetings of the Institute.



must allow it has been the subject of renewed attention, but not to any satisfactory extent. In etiology as little as possible is spared to hereditary influence. Its presence is very commonly ignored. The author acknowledges that the papers by Mr. Sedgwick\* some twenty years back did not at the time make on him the impression they deserved, nor did they excite then the feeling they have since raised of great merit and desert. They were indeed in advance of the time. The way the author first became convinced of the very principal part played by heredity in causation of disease was from the experience gained by him in a very earnest and prolonged enquiry into the causes of diseases of the skin, an enquiry which he carried on for many years over a very wide area of cases. He thus was made aware of its universality and potency as a condition or factor in the production of disease; but his participation in this study, however earnest and prolonged, might still be called narrow and empirical. As an initiation, however, it was commendably safe, and indeed might be preferred, he conceives, to any other kind of experience, as it brought him in contact with a number of concrete data which it was impossible to disallow or misapply. It also furnished a very necessary training, for in the pursuit there is really a knack or method to be acquired. Seldom can such enquiry be made to extend over a wide field: if something is found, far more escapes. There is commonly a disinclination or aversion on the part of the patient to minute enquiry, which, to be of value, should be copious in detail. Thus, in most cases, the search after heredity is a disappointing task in which the trouble is great and the fruits are few. So it happens that the family practitioner, whose opportunities are of the very best, is seldom alive to the performance of it, and does not contribute so much as he should to the general fund. It has been affirmed that the study of skin diseases offers the best field for gathering facts of heredity. Without pledging himself to so disputable an opinion, the author will allow that there is some inequality among diseases—those affecting the nervous system notoriously presenting abundant examples. Beyond the two classes we have particularised, and arthritic affections, hereditary influence is little sought for; yet many curious revelations will be made. The author has been much struck with the hereditary character of varix sometimes occurring very early in adult life; and phlegmasia dolens is also hereditary. In hemaphilia perchance the vessels are involved. No structure or tissue seems exempt, and even parasitic and contagious diseases are governed by heredity.

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\* Mr. W. Sedgwick, *British & Foreign Medico-Chirurgical Review*, April and July, 1861, and April and July, 1863.

As to direct heredity, *i.e.*, the direct transmission from parent to child of a disease identical in character and species, it is only now and then that this is found; but it is pretty sure to be met with in the common course of professional experience. Its occurrence in three successive generations may be called quite a rare event, and always worthy of a record. When a disease is repeated four times in direct succession it is a fact so rare as to lie quite beyond the experience of most practitioners. The author has met with the case of four generations affected by ichthyosis, but the succession in the last ascending link was collateral. In the rare and singular case of ichthyosis, of old date, reported by Mr. Baker in the "Philosophical Transactions," when it last came into view, it had been prolonged in the line of male descent without a break for five generations. In all probability it would extend further, but there is no record.

Considering that about one half of the cases of ichthyosis betray an hereditary element, one has a right to conjecture that if the ancestor could be subjected to interrogation a second series would be unfolded. In heredity it is not what exists, but what is found that is recorded. Some writers have considered four generations\* sufficient for a complete change of type in the system. Prosper Lucas, of high authority on the subject, agrees with certain other authorities in finding a limit at six or seven generations,† which he thinks quite as much as experience will warrant, he can go no farther than this; but he refuses to abide by it as a law, or even as a rule—it is simply a matter of record. Heredity, according to Prosper Lucas, has no assignable limit. The prescriptions of Hindoo law, as is well known, give seven generations as all that nature can require for clearing off impurity from infusion of baser blood. But in the light of modern research we have instances of reversion which go beyond this boundary. Such was the case of our late revered Sovereign, George the Third, quoted by Mr. Sedgwick from the pages of Thackeray's "History of the Four Georges," which in this particular at least seems beyond dispute. The dreadful calamity under which our worthy monarch suffered seemed inherited from his ancestor in the eighth degree of ascent, who, with quite a remarkable similarity, was also like him in his æsthetic tastes, and further in the number of his children. In cases of deficient phalanges of the fingers, ten generations have been mentioned inherited by females alone.‡

With the increased industry which is being applied to these

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\* Bomare, Dic. Univers. d'Hist. Natur., Tom. I., p. 54.

† Prosper Lucas, Traite de l'Heredité Naturelle, Vol. II., p. 893.

‡ See Darwin, Antiquity of Man, Vol. II., p. 73. London, 1868.

researches we may in time possibly reach a little further. If it is allowable to seek for analogy in natural history, we shall find in the words of Mr. Darwin, "that characters of almost every kind are capable of re-appearance after being lost for a great length of time." In silk-worms it has been found that proofs of atavism, *i.e.*, reversion to a lost type under the influence of heredity, will occur after a hundred generations.

The facts obtained from breeding and stock-keeping are patent and powerful as regards the broad truths of heredity, and they have probably fastened on the minds of the lower ranks of society. It might be expected that out of wide experience of an empirical character we might find in this field some hard and fast rule, or at least an approach to certainty: but breeders differ so much as to be little reliable in a scientific sense. Some say four generations are enough for complete conversion of type, others that twenty hardly suffice. Mr. Darwin, in the case of bantam fowls, notices reversion after thirty generations. But with regard to the human race one has to regret that the recorded data as to atavism are far too few to afford anything like deduction from an average, yet there is no reason for believing that they are of unfrequent recurrence, however otherwise than easy of apprehension, nor is there reason to conclude that they are less sudden or capricious than in the animal and vegetable kingdoms, for many a case which we call idiopathic may possibly be atavic, and of distant reversion. In endemic complaints, such as goitre and cretinism, no doubt some large share is attributable to the law of inheritance. It is right, however, to state that an author of much talent, Mr. Francis Galton, in a deservedly admired and popular work,\* has expressed an opinion rather opposed to the frequency of atavism. As regards the transmission of qualities insuring some degree of social eminence, he believes the growth and decrease of ability and intellect in families is pretty regular and rapid without being sudden. In inheriting superior ability, speaking roughly, according to this author, the percentages are quartered at every remove, and the frequent sports of nature in producing prodigies must be regarded as apparent and not real. Scarce reconcilable with these data are those furnished by Moreau of Tours, who, in his work "On Morbid Psychology in Relation to the Philosophy of History," has supported the opinion that all marked deviations, whether in plus or minus, from an average standard, are bordering on disease, and partake in some degree of a morbid principle. Works of this kind, however admirable, are seldom of a final character, and it may yet be a subject of doubt

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\* Galton "On Hereditary Genius," p. 83.



whether the highest class of genius is inherited, that is to say, in direct transmission from the more immediate progenitors.

The amount of definiteness which attaches to diseases in their several types has encouraged us to class them, like organisms, into something like genus and species, which is simply an analogy. Diseases are far from having that fixity or permanence of type that we find in the organic world, being rather conditions or accidents of living matter in the serial evolution of generated beings. As in the individual, so from generation to generation, diseases undergo metamorphoses, more or less complete, being often changed into what Burton,\* in his "*Anatomy of Melancholy*" calls some "symbolising" disease.

Thus, as Baillarger has long ago pointed out, insanity is correlative with phthisis, dartrous affections, scrophula, asthma, and gout. It is often masked by neuralgic and hysterical affections, by strabismus and contracted limbs. So skin disease alternates with rheumatism, bronchitis, epilepsy, and other affections. What is called the metamorphosis or transmutation of diseases will greatly occupy those who make in the consulting-room an earnest study of heredity, the best fruit of which will be to make one acquainted with the *nexus* or interdependence of diseases and their true succession. This study, more or less neglected in the present day, forms one of the highest accomplishments of the physician, and can only be carried on by long and detailed history of cases. It is also well if an abiding trust is given to clinical work, and that it should not be so much interfered with as is common by pathological preconceptions. It is not enough to say that a family is unhealthy, but all the morbid forms should be exactly particularised; as, for instance, in a family subject to insanity; obesity, asthma, and strabismus, would be revelations of an important class; and with skin diseases, it is not sufficient to say they arise from scrophula or arthritic affections: all nicer particulars should be written down, or we should have a poor idea of their causality. It is, indeed, under these masked forms, under such correlations, that diseases are lengthened out; and it is not too much to say, that subjected to this change of form the reality of hereditary transmission is largely manifested. It is also the commonest mode of transmission of disease in the sense of heredity.

Only when clinical work is pursued in this spirit, the study of heredity ceases to be disheartening, for though it is necessary to travel over a wide field before meeting with what are called its most striking facts, there is here source enough to nourish a continual study. But this is so little felt and so little understood

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\* *Anatomy of Melancholy*, Vol. I., p. 89, Lond., A.D. 1827.



by the practitioner, that at last it comes to be ignored—and yet there is reason to believe that the record of cases is generally esteemed. The fidelity of some of the repetitions of heredity go beyond all expectation, which is the more remarkable as, allowing for hereditary aptitudes, predispositions, and shaping reactions, we are not prepared to look for such precise results. I may refer to cases of apoplexy from sanguineous effusion in the Pons Varolii recorded of late, as repeated successively in parent and child at adult age; the same with cases of multiple tumours and multiple exostoses. There seems, however, a great inequality as to capacity for transmission among diseases: thus, insanity is notoriously hereditary, and of its forms some more than others. It is the same in skin diseases, they vary among themselves. Cancer, again, is notoriously hereditary, but lupus, also reckoned among the neoplasms, is scarcely hereditary, at least I have not seen it to be so, yet sometimes in brother and sister it occurs as a family complaint.

Let so much suffice as to the heredity of disease and its range, which is what I can treat of with most confidence as with most experience. I cannot fail to speak with admiration of the labour of naturalists in the field of heredity, in which they have indeed been far in advance, at least at the present epoch, of our physicians, affording them hints of which they should not be slow to avail themselves. The study of heredity in the sick room or in family practice, if carried on with spirit, is a safe introduction, and perhaps the best, to a more enlarged acquaintance with it through books and intercourse with mankind, as in the wider field of natural science. And, if, with the advantage of such an introduction, we bend our attention to the historical page, and to the observation of ethnological and genealogical facts, we shall find indisputable evidence that hereditary principle is of an irresistible force. History indeed will form the principal, and society the ultimate, field of study. In the rich and ample *mémoires* of recent times, especially I might say of the French, we shall find lively examples and proofs of heredity; nor is ancient lore to be neglected, from its intensely personal and legendic character it is full of material for our instruction. Josephus, in his “Antiquities of the Jews,” says, that in the enumeration by Herodotus of the nations that followed Xerxes, in his campaign against Greece, he can single out, by description of their features, the Jewish tribes. They are spoken of as having faces like horses, with a round denudation on the crown of the head, very much as one sees them in the present day. The negro preserves that type which we find in inscriptions and engravings of the earliest date. The Celt and German retains the characteristics which were so admirably described by

Roman writers. The Aramæan, as represented by the Jew, and also, in great part perhaps, by the modern Greek, is in living contrast with Indo-Germanic or Aryan stock, a contrast which it has been conjectured to have pre-existed before the issue of original swarms from the north-east corner of their Asian home, so that these differences may be supposed to date from the earliest records of the human race. It cannot be denied that the labours of modern Orientalists have thrown a flood of light on the early history of mankind, and that a certain identity has been established between the northmen of Europe and Asia; so that, in fact, the German, and especially the English, find themselves the least alloyed representatives of the Aryan races, whose traditions, allowing for the long lapse of time, are wonderfully preserved. It is curious to see our passions, our industries, our policies, nay, even to the type of our vices imaged in this race or people, whom a sharp line divides from all that surrounds them, and when they have mixed largely with other races, seem to have done so to their loss in deterioration of stock. One of the greatest advocates of purity of family blood, Mons. le Comte de Gobineau, a modern historian and Orientalist, has particularly insisted on the inequality of races, and the danger of deterioration by admixture. To his historical and ethnological works he has added one of lighter vein, the history of the Gurney family in France and England, which gives the most lively illustrations of his matured convictions.\* This shade of opinion, however, is liable to meet with considerable opposition in these days of advanced liberalism, which are extremely favourable to admixture of stocks, or *miscegenation*, as it has been called. Modern society absorbs some very low types, probably to its detriment, reason entering less largely than passion and interest, or convenience, into considerations of marriage. This has probably been always much the case, even when pride of race and family had more empire it would be scarce a match for interest or wealth. Even royal marriages and adoptions are subject to this law. When the Stuarts were brought in as sovereigns of this country, the union of Scotland and England was too overpowering a consideration to allow of any counter-check. Less excusable, in point of policy, was the marriage of Katherine of Valois with our Henry the Fifth, which brought speedy ruin to his dynasty, and introduced a thread of insanity that lasted to its ultimate extinction. The election of Charles Quint to the imperial throne seems one of those occasions where reason might have dictated a better choice, regard being had to the wretched antecedents of the Spanish family from which he was derived.

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\* "Histoire d' Ottar Jarl, Pirate Norvegien et de sa descendance." Paris, 1879.

The study of heredity in the pages of history should not be superficial and slight. It is to be lamented that as yet it has not been very deep, and a want of exactness, especially under political bias, is easily discerned.

The history of France offers fair opportunity for the comparison of family types, especially the dynasty of the Valois—so intelligent, so brilliant, yet unsound; that of the Bourbons, especially in the collateral branches, scarcely less informing. Not only the peculiarity of disposition belonging to the family, but even the cast of features carried through many generations are proofs of hereditary descent. The lip of the Austrian and nose of the Bourbon are proverbial, and have lasted through many generations. Whatever calculations may have been conjecturally made as to the average duration of noble stocks, we know that some of them, as the Guelf and Hohenzollern families, have lasted for centuries without impairment, and there are others which surpass them. The deservedly esteemed and great naturalist Darwin was accustomed to refer atavism to times so remote as passed credibility, but little doubt can exist that in the repeated evolutions from the germ, which carry on the chain of existence, the influence is felt of far off progenitors. All reasonings as to quantity or dilution of blood seems out of place. If the effects are not dynamical, we may at least avow they are not understood, and we may place the facts of heredity among those which we may garner and cherish, but cannot interpret or foretell.

The chief practical lesson to be derived from this class of study would be carefulness and circumscription in marriages in the interest of the children and family descent. So far as the writer can discern, with some drawbacks in this island, the Northern or Scandinavian stock, as naturalised among us, seems to offer the best guarantees, so far as race is concerned, and the colonial element is greatly to be shunned. No doubt his studies in the distribution of elephantiasis have contributed greatly to this prejudice, for in some parts of our empire it seems cantoned, to use a familiar phrase, every one has it, either latent or manifest. There is no doubt that the existence of this disease in the middle ages contributed much to that exclusiveness in alliances which afterwards became a subject of derision and rebuke. Equality seems not so much a law of nature as an artifice of civilisation; a man is said to belong to the age in which he lives—so he does in respect to its reactions; the influence of a social medium is not to be denied; but in a material or natural sense he belongs much more to his line of progenitors as to structure of body and mind, and to his line of descent in his obligations. A state of society where the contrary opinion



is held is quite possible; nay, in political convulsions of a neighbouring state, it has been held criminal to have had "ancestors:" but the truths of heredity will vindicate themselves.

The amount of instruction arising from the study of heredity cannot fail to be great, whether we regard it in a social or physiological view. A great extension has been given to this study by modern scientists, who make it so intrinsic a part of the whole great scheme of animate existence, that it would be impossible to exclude it from those questions which concern the origin and evolution of our race, and, indeed, of all organic being. So, with an improved physiology, we are likely to have a reformed psychology, in which synthesis is more relied on than analysis, and with embryology a doctrine of psychogeny in which the truths of heredity are largely involved.

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Dr. G. W. CHILD said that he had given a good deal of attention to the subject, and he thought that hereditary influence had been considerably underrated, as a factor in pathological phenomena. He thought that the author had dwelt rather too exclusively on the historical and biographical side of the question, and had not sufficiently considered the physiological bearing of the subject. If we look at the physiology of the brain and nervous system, we get quite another view of the question. The infant's imperfectly developed brain is gradually developed and moulded under the influence of sensations received through the nervous system, and it had its origin in a resultant of the mental peculiarities of the brains of its parents, and these had of course been developed under similar influences. By training during the development of an infant mind, you can make it a good or a bad specimen within the limits of its capacity, but you cannot make it anything outside these limits. A man's mind is the result of education and training working on the original constitution, and this original constitution plays a far more important part than the forces brought to bear upon it. He then gave instances of a lady who had a deformity in her hand which was said to be the result of early training, and her daughter, but none of her sons, exhibited the same peculiarity. Of a gentleman who had one eye seriously damaged, but not destroyed, and all his children had the corresponding eye smaller than the other. Of the entirely diverse impulses of different individuals in sudden emergencies, &c. He thought that there was some difficulty in reconciling the germ theory of disease with the statement made by the author that all diseases are hereditary, even the contagious; for if they are controlled by hereditary influences, what part does the germ theory play in their production? We have instances of certain families becoming victims to the same diseases at about the same age in different generations, and such instances appear



difficult to reconcile with the germ theory in some of its more recent developments.

Mr. FRANCIS GALTON, F.R.S., said that he felt a difficulty in speaking on a subject that covered so wide a field, and on which so much more had been written than he had heard alluded to. He did not as yet find that sufficiently definite points had been raised to admit of being thoroughly discussed. He thought that the most important information on heredity that could be given at the present time would be such as should show the degree, if any, in which faculties acquired by the parent were inherited by the offspring. Much loose statement on the subject was afloat, while the fact seemed too much overlooked of the independence of the life of the ovum from that of the parent. It should not be forgotten that the ova of the parent had apparently a separate existence when that parent herself was a foetus of a very few weeks old, and that they and the children derived from them had never the slightest nerve or vascular connection with the mother, but were nourished wholly by imbibition. It was difficult to see how, under these circumstances, any complex acquired habits could be transmitted hereditarily. The author of the paper had made many remarks upon one of his (Mr. Galton's) earlier writings, and considered that he had not accorded sufficient weight to reversion. Mr. Galton thought that the author was not aware of some of his more recent investigations on the subject of reversion which were described in 1877 under the title of "Typical Laws of Heredity," at a Friday Evening Lecture, given at the Royal Institution, and published in their Transactions. He there showed that the statistical similarity of successive generations, and the peculiar distribution of qualities among them so far as they conformed to the exponential law of deviation (as shown to be the fact in certain cases, especially in height, by Quetelet) could not exist in the face of the tendency of faculties to deviate from the parental standard, unless reversion followed a certain definite and very simple law. He further tested this view experimentally on the sizes of seeds of plants, by growing on a large scale successive generations of sweet peas of carefully measured sizes, and he found, as a matter of fact, that in that case reversion did follow the law required by theory, which was simply this, that the greater the parental deviation from the average of the race, the greater the tendency of the offspring to revert towards that average. He could not follow the author in the very complex questions of family and race, each of which required a very thorough statement, and was open to much discussion.

Mr. W. WHITE, F.S.A., said that in the natural development of trees, seeds will never produce exactly the same fruit as the tree from which they are obtained; but if you graft a portion of the tree on to another stock, you may get the same fruit as the original, but with this peculiarity, that the tree apparently assumes the age and characteristics of the tree from which the graft was taken, rather than of the stock upon which it is grafted. Its exhaustion and decay take place contemporaneously with the original stock. He

thought that this phenomenon might have some analogy to the difference between the hereditary tendency of accidental or local blemishes and peculiarities, and the hereditary tendency of disease and constitution.

The Rev. E. WYATT EDGELL admitted that it was a difficult question how far the disposition was due to hereditary descent, and how far to the development effected by education and outward circumstances. But as for Lock's theory that the infant mind is like a blank sheet of paper, and its character formed entirely by education, he considered it to be *quite inadmissible*. He had had to do with education, and had come to the conclusion that its influence was *very much over estimated*. Two boys go to the same school, are trained by the same masters, go through the same course, not only of reading, but of recreation also, and yet they leave the school with dispositions as different as they entered it. For an illustration of this, he mentioned the case of Lord Byron and Sir Robert Peel, who were both educated at the same time at Harrow.

He considered that there was little doubt as to congenital peculiarities showing themselves in subsequent generations, but as to habits acquired by education, he believed that if they descended at all it was only in a very limited degree indeed.

Mr. WILLIAM SEDGWICK, M.R.C.S., referred to the great difficulty that there was in tracing hereditary diseases, as two or more diseases sometimes became associated together in succeeding generations. Then there were certain disturbing conditions to be taken into account, such as climate, which no doubt had a very material influence on the hereditary tendency of certain peculiarities and disease. Those peculiar individuals, who were liable to bleed to death from the slightest cut or wound, were confined almost entirely to certain latitudes. As an instance of a long transmitted peculiarity in muscular power, he said that he knew of the case of a French gentleman who had an unusual development of the muscles of the scalp so that he could throw a book from his scalp without moving his head. This peculiarity was exhibited by his father, uncle, grandfather, and all of his three children; and also by a cousin in the seventh degree, who resided in another part of France. The division of this family into two branches had occurred eight generations back.

THE CHAIRMAN (Dr. Alfred Carpenter) thought that there should be a very wide distinction made between the hereditary tendencies of the body in health and those which arise in disease. The one has reference to natural conditions connected with the first formation of man, the other has been acquired by degradation of form. That a concrete brain at its first formation in the Adamite contained a capacity to produce every human faculty in perfection, but that in future developments one nerve cell may get starved by the growth and crowding upon it of others which have become more prominent; and as a consequence some faculties have greater manifestation of existence

than others, which are simply non-developed: but the primordial atom upon which the faculty depends is still there if it could be brought into play and escape from the overshadowing influence of its neighbour. If we go back for seven generations we have 128 individuals who may each have had an effect on our present being, how impossible then it must be to trace each attribute of an individual to his immediate ancestors, for each of us may have been influenced by more than 100 persons, some of whom existed 200 years ago. So far, then, for natural attributes, as well as healthy tendencies, which have been dwarfed by means which have simply led to want of development. It has been stated that certain families are more susceptible to certain diseases than others, and certain alterations of form which are unnatural, continue to recur; but this is not difficult to understand if we look to analogy. A gardener can, by various means of culture and treatment, make plants exhibit certain alterations and peculiarities in the specimens under his immediate care. These are departures from the ordinary course of nature, which are set up by cultivation: they are caused by unnatural means, and if the plants are left to nature they revert to their original stock in the course of time. He thought that health, and all healthy faculties, were the natural portion of humanity, and that diseases and perverted functions were acquired by improper cultivation, but would be lost again if man was to follow the right course. He thought that there were hybrids in diseases just as there are hybrids in plants; these peculiarities would probably not be perpetuated, but would disappear in the succeeding generations, and the series would ultimately revert to their original form and original perfection. This told him that there were wide distinctions to be drawn between natural or healthy tendencies and those which were unnatural or unhealthy, which were acquired by cultivation, and which were in reality diseases. These would not continue if the conditions which set them up were altered and the individual became more natural. If we refer to history we find instances of brains of tremendous power occasionally cropping up (such as those of the men who wrote the books of Euclid or built the gigantic cities of the Babylonish Empire). They must have been far in advance in development of the ordinary brains of the present day; no men of the present day could do what Euclid did, or could now build such a city as Nineveh with the mechanical means then at the command of the architect. He thought that these minds had left their mark in the races of men upon the earth if they had left any progeny behind them, and that similar minds would now and then come to the surface. He referred to the Jews as a remarkable instance of heredity coming to the surface everywhere with traces of their original power, amid all the difficulties in which they live—retaining their distinctive peculiarities and superiority in the arts, in science, in commerce, and in music. He thought that the English nation contained crosses of all the best of those hereditary powers in their later stages of development as well unfortunately as some of the worst; in her nationality, he hoped that we should ever maintain our proud pre-eminence in what is good, and that the evil tendencies



produced by unnatural conditions would die out like the hybrids of the gardener, and only the healthy and natural attributes remain. Education would develop those which are inherent in man, if that education is directed aright, but it would bring out morbid tastes and morbid growths if they were directed on wrong principles and on wrong lines. The one direction is natural, and belongs to the divine power of our nature, the other is of mundane and of unhealthy production, and must be opposed by healthy actions and developments, so that it may be rooted out, and instead of the natural attributes of mind being starved, they will then overshadow the evils which otherwise would master them in their turn, and lead to national decay.

A vote of thanks to Mr. Gaskoin for his interesting paper was proposed by Mr. W. Horton Ellis.

DR. BARTLETT, after seconding the vote of thanks, said that he thought there was some difficulty in accepting the theory of any peculiarities being hereditary to an unlimited extent; for instance, we had had many ancestors, and would probably have many descendants. Now, if all the peculiarities of each of our ancestors are to be carried down to all our descendants along with each one's peculiarities, what a mass of combinations we entail on future generations. He thought that we ought to deal with the question of how much of any faculty or power can be taken up in one individual without further transmission, and thus loose, to a certain extent, its peculiar hereditary tendency. The author did not appear to have dealt with the question of how far muscle had been transmitted. Another point that he thought very interesting was the question of what effect food had upon heredity? We know that climate has an influence, and he thought it also probable that food materially affects the question. Although no doubt health is hereditary to a certain extent, he thought we had not sufficient data to form any definite opinion of the range of this hereditary tendency. He was convinced that the essay of which the author had just given them the abstract would form the first chapter, or rather the first volume, of a History of Heredity—which, as regards the study of man, is the History of History.

Mr. Gaskoin briefly replied to some of the points raised in the discussion. The proceedings then terminated.

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# AN OBSTRUCTION BY THE LAW TO SEWAGE DISPOSAL,

BY HENRY C. STEPHENS, F.C.S.

*Read April 19th, 1882.*

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## ABSTRACT.

Under the Public Health Act of 1875, owners and occupiers derive rights which prevent Local Sanitary Authorities from carrying out systems of Drainage, involving the separation of the rain-fall and surface-water from the Sewage. The Section of the Act bearing upon this question, will be discussed in this paper, but before doing so, the Author deems it convenient to bring forward some of the advantages which can be urged in favor of the separate system. Among the advantages claimed for it, it is asserted that—

I.—From their nature, the modes of disposal necessary for rain-fall and for sewage are opposed, and as the requirements for their drainage differ greatly, it can be shewn that in the majority of cases a system of employing carriers for excreta, and house waste of towns, apart from the carriers for surface drainage and storm water, is less costly than the system of employing the same carriers for both sewage and rain-fall.

II.—By completely separating rain-fall from sewage, drains of small size only would be necessary for the sewage, such drains from the material employed, and from their construction, can be rendered nearly or quite impermeable; thus greatly diminishing or entirely obviating one important cause of soil and water pollution.

III.—The pipes of relatively small size required for sewage only, can be effectually flushed by *moderate* quantities of water, and mechanical flushing at will of a frequency adequate to the demands of the season, and of the existing health conditions, must be more convenient and secure for sanitary purposes than the flushing which storm and surface-water (from the nature of its flow in sewers, and from its being dependent on the irregularities of rain-fall) can supply.

IV.—The carriers for sewage and rain-fall combined are

confessedly incompetent to carry off the water of a heavy storm. Overflows into the sea, or, in the case of inland towns and districts, into water courses or rivers have to be provided. The *overflows so provided to relieve the sewers* at times of sudden storm, can only be partially depended upon to prevent the flooding of dwellings by the backing up of Sewage in the sewers. At times of storm, the effects of the scour of the sewers ordinarily renders their contents at out-flow very foul.

V.—The mixing of rain-fall with sewage renders it necessary to provide a STORM OVERFLOW *also at sewage disposal works*, and the existence of such STORM OVERFLOW destroys the guarantee for constant and systematic treatment of sewage which might otherwise subsist, because, by the storm overflow, sewage can be allowed to escape without treatment, not only at times of storms, but whenever at the disposal works or irrigation farm it is convenient to discontinue the treatment of sewage. Thus generally it may be asserted that the existence of STORM OVERFLOWS in systems of sewerage, and at disposal and irrigation farms, have gone far to render much of the so-called sewage purification a costly pretence.

VI.—Modes of Sewage disposal, whether by chemical treatment or by land irrigation, necessitate manipulation of the Sewage by pumping, by storage in tanks, and in other ways. The cost of construction and maintenance of works and plant is much increased by the great scale upon which it is necessary to provide for the reception of the mixture of rain-fall and Sewage.

The author has found reason for believing that much of the difference in experience as to the results of irrigation and the retention of the manurial constituents of sewage by soil, is really attributable to an insufficient understanding of what may be described as the “conditions of retention,” under which the soil absorbs manurial constituents when dissolved in water; it appears that

VII.—Soil possesses, with regard to its manurial constituents, a capacity of abstraction from their solution in water greater in proportion as the solution is more concentrated. Strong Sewage will yield to soil by percolation a very large proportion of the manurial constituents contained in it, while weak Sewage will yield only a very small proportion of its manurial constituents; the practical result, probably being, that strong Sewage can be easily and effectually purified by land irrigation, while, *upon weak Sewage, land irrigation exerts little power of purification.*

VIII.—If rain-fall were rigorously excluded from Sewage, its utilisation as a manure for the purposes of normal agriculture would become practicable, because, as its volume would be constant, and would not exceed the water supply in quantity,

such undiluted Sewage could be carried to areas of suitable land sufficient for the complete utilisation of its manurial value. Such Sewage utilisation is greatly to be preferred to the imperfect assimilation by plants of rapid growth, grown mainly with the object of destroying Sewage matter irrespective of demand and market value.

IX.—It is claimed that:—

1. The sparate system is of greater economy in drainage, and allows greater impermeability in the construction of sewers.
2. That it admits of greater efficiency in flushing.
3. That it prevents flooding by sewage.
4. That it affords better prospect of a remunerative return from works of utilization.
5. That it allows a far greater absolute purification.
6. That it greatly diminishes the possible extent of water contamination.

But these advantages are at present practically denied to the community owing to drainage rights acquired by owners and occupiers in their relation with the Local and Sanitary Authorities of their districts under the 15th and 21st Clauses of the Public Health Act. By the 15th Section Local Sanitary Authorities must cause to be made, and must keep in repair such sewers as may be necessary for effectually draining their district, and by the 21st Section “the owner or occupier of any premises within the district of a local authority, is entitled to cause his drains to enter into the sewers of that authority, on condition of his giving such notice as may be required by that authority of his intention so to do, and of complying with the regulations of that authority in respect of the mode in which the communications between such drains and sewers are to be made, and subject to the control of any person who may be appointed by that authority to superintend the making of such communication”.

By the definitions of the Act, “premises” includes messuages, buildings, lands, easements, and hereditaments of any tenure; and “drain” means “any drain of, and used for the drainage of one building only, or premises within the same curtilage and made merely for the purpose of communicating therefrom with a cesspool or other like receptacle for drainage, or with a sewer into which the drainage of two or more buildings or premises occupied by different persons is conveyed.” Thus the power of local authorities only extends to the regulation of *modes of communication* between the drains of owners and occupiers and the public sewers.

X.—Though under the 24th section of the Public Health

Act it is competent for Local Authorities, at the expense of the Ratepayers, to alter or construct anew the drainage of houses if such drainage is not adapted to the general sewage system of the district, there is, notwithstanding, no power in the Public Health Act or elsewhere enabling Local Authorities to decline to approve plans, by which excreta and house waste with the rain-fall are shewn to be received into carriers common to all, or by which the house drainage is shewn to be connected with any surface water drain or drains belonging to the same premises. "Premises" are not brought under the powers of this Section, though the drains from "Premises" contribute more rain-water to the Sewers than the drains from Houses.

XI.—Consequently the sanitary measure of greatest urgency and importance for the health of the community—the conversion of the waste products of life into matter innocuous to health—is rendered costly and almost impracticable from rights arising under the Public Health Act of 1875, such rights by their operation creating "An Obstruction by the Law to Sewage Disposal."

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Mr. E. C. ROBINS, F.S.A., agreed with the author that there were a great many objections to the combined system for the disposal of sewage. Before the Fire of London there was no combined system, but from after that date this system had been adopted and perfected, and laws formed for carrying out its requirements, on the supposition that it was the best method for disposing of sewage. He thought that Mr. Stephens had proved conclusively the desirability of the separate system, but had not fully shown how to dispose of the storm water, which is a great plague in either system, and wherever a separate system was adopted it would be necessary to provide for both surface and subsoil drainage.

\* Mr. G. J. SYMONS, F.R.S., with regard to the difficulty which Mr. Robins had mentioned as to the disposal of the storm water in the separate system, said that there would be numerous outlets and water courses into which drains carrying simply rain and storm water, could be diverted, but the sewage would all have to be taken to one place where it could be properly disposed of. The storm water was, he thought, one of the greatest difficulties in any scheme for the disposal of sewage where the combined system was adopted; for where pumping was necessary the pumping power had to be far beyond the ordinary requirements to deal at all effectively with the water carried down the sewers during a heavy rain. In any precipitation or irrigation scheme it also upset calculations as to the amount of sewage to be disposed of.

\* This should be Mr. F. Symonds Windsor Great Park



Mr. ROGERS FIELD, M.I.C.E., thought that Mr. Stephens' paper was very valuable, as it called attention to a matter that was not generally understood. He must state at the outset that he could not agree with those who said that the separate system ought to be adopted everywhere. This sweeping assertion, which was known to be wrong by engineers, had brought the separate system into discredit. In some cases the combined system was no doubt the best; in London, for instance, it would probably be impossible to adopt the separate system. In smaller towns, however, it often happened that by adopting the separate system you could dispose of the sewage at a moderate cost, whereas if you adopted the combined system the quantity of sewage would be increased to such an extent that it would be impossible to deal with it except at an outlay quite out of proportion to the means of the district. The separate system did not necessarily require two separate and distinct systems of drains, as the storm water could be carried off by surface flow, and you would find a dozen outlets for pure water where you would only have one for sewage. The fact that the Public Health Act, did not give power to the sanitary authority to compel householders to separate the rain water from the sewage, and to turn them into different drains was a serious obstacle to the adoption of the separate system. If the only surface water which could be excluded from the sewers was that from the public roads, and if the rainfall on the roofs, yards, and gardens had to be admitted to the sewers comparatively little advantage was gained from the separation. He had acted as consulting engineer to a town that wanted to insert a clause in their bye-laws compelling the householder to carry their roof and yard water under the footway into the gullies, and to turn only the house drainage into the sewers; but on applying to the Local Government Board they were informed that they could not insert it as a compulsory clause, but could only recommend it. In comparing the separate and combined systems it should be borne in mind that the combined system, as carried out in this country, was generally only a compromise. In a perfect combined system the sewers ought to be large enough to carry off the heaviest rainfall, but in hardly any place was this the case, certainly not in London, where the sewers were calculated to carry off only a  $\frac{1}{4}$  of an inch of rainfall in 24 hours, or about  $\frac{1}{100}$  inch per hour, whereas a fall of as much as 3 inches in an hour had been known to take place, and 1 inch in an hour was certain to occur sooner or later. In America it was usual to provide for a fall of 1 inch in an hour in calculating the size of sewers for the combined systems.

Mr. DAVID CHADWICK, F.S.S., did not fully agree with the views advanced by Mr. Stephens, and thought that the speakers had not adduced many arguments of importance in favour of the separate system. The idea of small sewers had been brought forward by Mr. Edwin Chadwick more than twenty years ago. What was wanted to prove the utility of the separate system, as advocated by Mr. Stephens, was a practical test where the system had been tried. The City of New York was not a fair example, as it was practically an Island.

He thought that sewage ought not to be considered as an article of value, but as a thing to be got rid of,—worth something in the right place, but it was nearly always in the wrong place. In his opinion, to attach any value to sewage was a delusion, and he instanced the results obtained at Leicester and other places. It would be very difficult to carry out Mr. Stephens' suggestions, as nearly all old towns had now adopted some system which could not be altered without a large amount of trouble and expense. Although not agreeing in the present practicability of carrying out on a large scale Mr. Stephens' suggestions, they were no doubt valuable as pointing to a standard of Sanitary completeness and excellence, to which the efforts of Municipal Authorities might with great advantage be directed.

Mr. R. B. GRANTHAM, M.I.C.E., thought that the Institute was very much indebted to Mr. Stephens for bringing the subject forward. The question of the combined or separate system for sewage had been discussed at the Institute of Civil Engineers, and the general opinion of the speakers was that the separate system was the most advantageous. In some cases with which he had had to deal, he had found no difficulty in separating to a great extent the rainfall and the sewage for precipitation and gravitation schemes. In any arrangement for sewage disposal, it is almost impossible to provide for the storm water when it is combined with the sewage, but he did not think that it mattered much if the rain water from roofs and paved yards was admitted into the sewers.

W. C. FOOKS, jun., thought it was hardly fair for Mr. Chadwick to say that sewage was utterly valueless, and all schemes for separating the storm water were quite impracticable, and then to call on Mr. Stephens to show where the plan he suggested had been successfully carried out. Some towns have been so convinced of the advantages of the separate system, that they have taken the trouble to obtain private acts to overcome the difficulties placed in the way by the sections of the Public Health Act. Before the passing of the Public Health Act, sanitary authorities had no power to compel the separation of rain water from sewage, and after the passing of the act they were practically in the same position. He thought that the question was one in which the householders were largely concerned, and he wanted to hear what would be the probable expense to householders of adopting the separate system, as (assuming that for the purposes of drainage the separate system was preferable) that was a matter which would, probably, have quite as much weight as the desirability of the scheme considered with reference to the value of the sewage.

Mr. J. WALLACE PEGGS said that there could be no doubt that from an engineering point of view, the separate system of sewerage would be more economical than the combined system: especially was this the case where old existing sewers could be utilised for the storm

waters. In cases where all the sewage had to be lifted by pumping power, the separate system was shewn to great advantage, as the engine-power required was reduced to a known quantity, and the engines could be economically designed and worked. The success of the sewerage scheme of Memphis had shewn what may be accomplished on a large scale with the separate system. The advantage of the separate system of sewers was very great when you came to study the question of the ventilation of sewers. In the combined system you have great variation in the flow, and consequently surfaces stained with sewage are exposed at times, and large quantities of air would be required to travel through the sewers to maintain anything like a proper condition. With the separate system the ventilation becomes much more simple. The question of adapting the sewers of Paris to receive the excreta as well as the storm and slop waters will, no doubt, come prominently forward at an early date. The evil effects of the system of excreta disposal by the *fosse mobile* and the *fosse fixé*, are now fully recognised; and the question to decide will be whether the excreta shall go direct into the large sewers, which have flat gradients, or whether it is not possible to arrange a system of cast-iron mains inside the large sewers or tunnels, with good falls, to convey the sewage proper separate from the storm waters.

Mr. W. Russ, M.I.C.E., stated that he had carried out a number of sewerage works on a modification of the separate system, and the nearer that they approached to the true separate system the greater was the success. In the town of Ware, under his advice, the separate system was carried out in its entirety. The sewage was dealt with without difficulty, and the value of the farm on which it was employed in irrigation considerably increased. Where the separate system was adopted it was found that the sewage was almost exactly equal to the water supply, which fact made it very easy to calculate the amount to be disposed of in any sewage works. When required for sewage purposes the price of land was always enormously increased, which made it very desirable that the amount of sewage to be disposed of by irrigation or other methods requiring land, should be decreased as much as possible.

Mr. STEPHENS in reply, said he was well satisfied with the result of the discussion, and he hoped it would not be long before practical steps were commenced by the Institute to procure a modification of the existing law. Mr. FIELD had said that the separate system could not be adopted everywhere, and that might be the case; but it would be of great service to have the conditions which would prevent the application of the separate system clearly set forth. Engineers too often consider the matter almost wholly with the object of getting rid of the nuisance so far as a particular district is concerned, whereas the removal of sewage should not be considered apart from its reversion into material, if possible, possessing value, but at any rate harmless so far as health is concerned. It was impossible to over-estimate the importance of the fact to which he had particularly called



attention that evening, for if, as he asserted, land possessed but slight capacity for the purification of weak sewage, it became clear that by compelling an unwieldy dilution of the sewage, the Public Health Act itself, in an enormous degree, prevented the utilization and purification of sewage.

Prof. W. H. CORFIELD, M.D., in proposing a vote of thanks to the author, said that he felt sure they would all agree that Mr. Stephens had proved the desirability of an amendment being made in the clauses of the Public Health Act, to which he had called attention in his paper. He (Prof. Corfield) thought that the question of the adaptability of the separate system was very simple; in towns where the combined system had been in use, the old sewers could be used for the rain and storm water, and new pipe sewers laid for the sewage, in new towns or districts where a regular system of sewerage was adopted for the first time, there would of course, be no difficulty, Mr. Stephens had, he thought proved, that the separate system was theoretically the best, and we ought therefore, to aim at adopting it wherever possible. The clauses under discussion, had no doubt, been copied from one act to another, like many clauses in other Acts of Parliament, and therefore, did not represent such an advanced state of knowledge as the rest of the act. He might mention that there was another way over the difficulty than by going to the expense of a local act for the purpose, viz., by a sort of "back-stairs" legislation, as where a town inserts in the middle, or at the end of a local act, a special clause for a purpose quite different from the rest of the act; for instance, a town in applying for a local gas or water act, inserts a clause making the registration of cases of infectious diseases, compulsory; nobody interested in infectious diseases is likely to go carefully into a gas or water act, so the clause passes without being objected to. Similarly a town might insert a clause in a highway act, or any other act, giving it compulsory powers to adopt the separate system of sewerage.

The vote of thanks was seconded by Mr. Rogers Field, and after a few remarks by the chairman the proceedings terminated.

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